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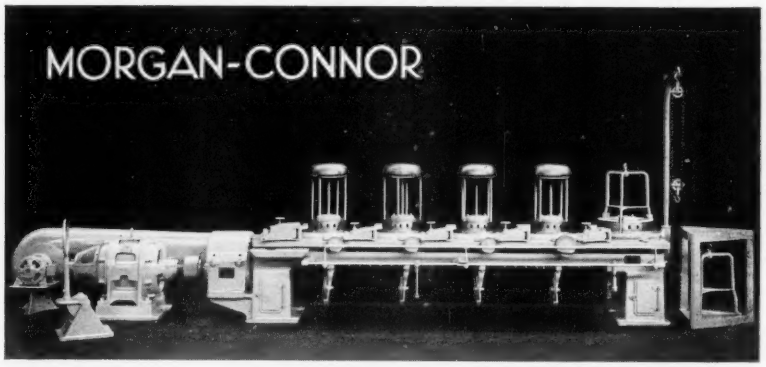

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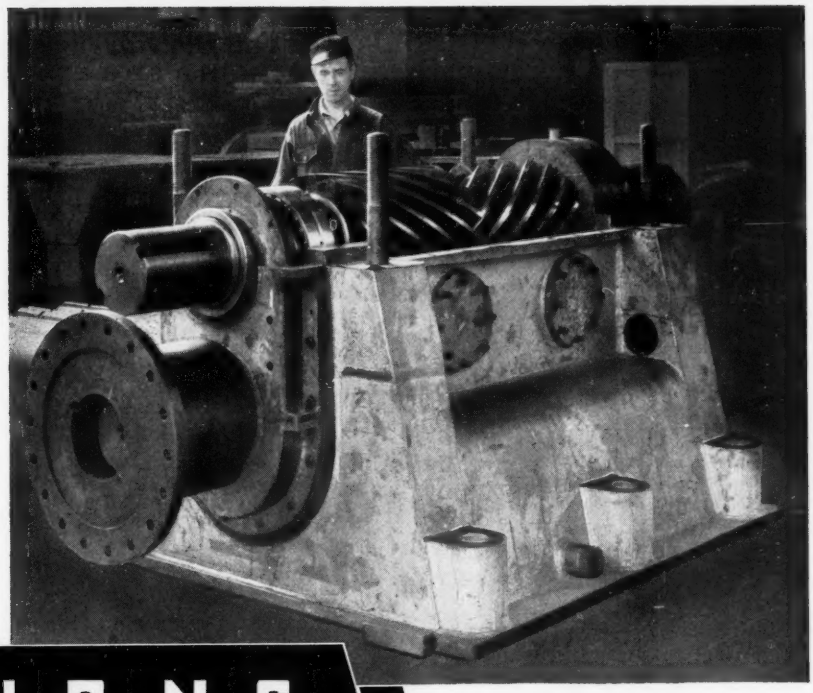

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A monthly publication devoted to the production of Wire, Rod and Strip. Wire Products and Insulated Wire and Cable.

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING.

Vol. 8 December 1933 No. 12

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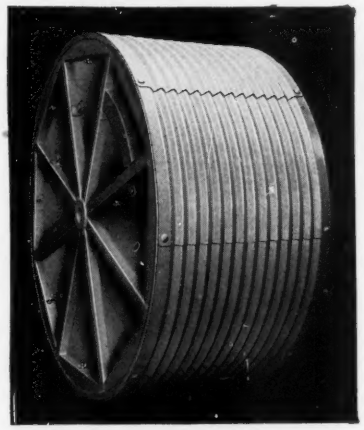

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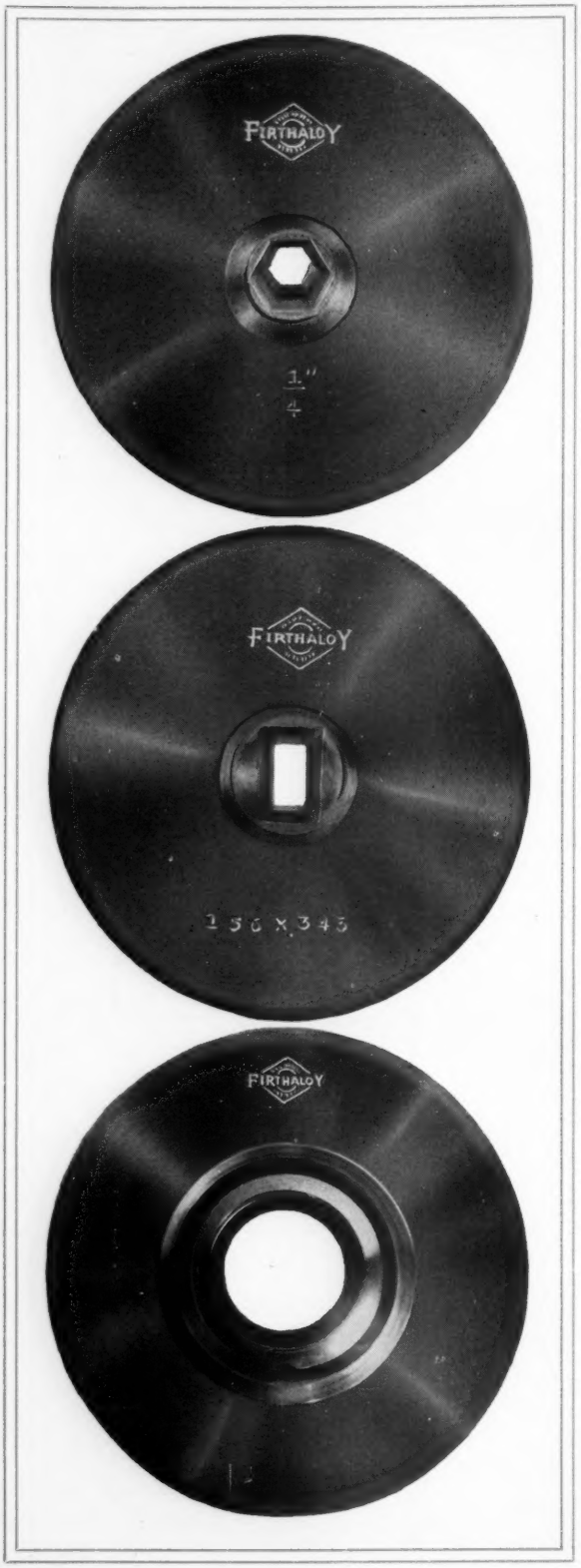

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Warping and Drawing In for Fourdriner Fabrics

By Kürt Jahn, Sallfeld, Thrg. Germany

A description of the methods in use in Germany, England and France together with a contrasting study as to the relative value of each method

Warping

WARPING consists of arranging upon the warp beam side by side all the wires which are to form the warp of the fabric. This warping or "beaming" can be done in any one of several ways.

1. Coned direct onto the warp beam in the loom, called the German warping system.

2. Laid straight, direct onto the warp beam in the loom the so-called English system.

3. Coned onto a transfer roll, and,

4. Laid straight onto a transfer roll generally known as the French system.

✦ ✦ ✦

THE principal weaving establishments of continental Europe use the 3rd and 4th warping systems, as these give more assurance of a uniform tension across the full width of the fabric. On the other hand the plants in English speaking countries incline chiefly to method number 2.

✦ ✦ ✦

Dimensions of Fabrics

FOURDRINIER fabrics generally run to a length of 40 to 50 feet. There are some as long as 100 feet, but these are unusual. It is customary not to beam up separately for each piece of fabric but, unless some local and temporary condition forbids it to put enough wire onto the warp beam for a number of pieces. The beam is nearly always made up to run off at least 4 to 10 pieces, or, for an average length of 50 feet each, 200 to 500 ft. It is still more common to beam up for 20 pieces, or at an average of 60 to 80 feet each, 1200 to 1600 feet of warp wires. Some of the largest plants regularly put 2000 to 2500 feet on the beam at once, not only reducing the machine time lost in warping, but raising the efficiency of the loom by cutting down the stoppages.

✦ ✦ ✦

The Warping Job

WARPING up for 1500 feet of fabric on a width of 12 or 13 feet takes about 4 days, and threading up the warp through the loom takes 2 to 3 days more, accorling to the fineness of the weave and the skill of the weaver. A skillful operator threads 1000 ends an hour, but as each end must be threaded twice, first through the heddle and then through the reed, this means only 500 wires pulled in per hour.

✦ ✦ ✦

IN laying out the warping job for a specified fabric length it must be borne in mind that there is a loss in length due to the crimping of the warp wires. This averages 7 to 10 percent, though in special cases and with special wire it may be reduced to 3½ percent. There is a further loss in total yield of the warp due to the "thrums". From both sources the loss is such that for a 1500 ft. total of fabrics, for example, it is necessary to lay up 1750 feet of warp. The loss due to the thrums can be cut down considerably by adopting 'false thrums" which will be described at the end of this article.

✦ ✦ ✦

IT is needless to state that all the warp wires must be of the same length. For instance, if it is proposed to weave a plain fabric, 1500 ft. total length, number 70, and 13 feet wide, a warp must be

prepared with a width of 13 feet, 70 wires to the inch, a total of 10,920 single wires. Such a warp must first be laid up on the beam. As it is impossible to wind such a large number of wires off the spools and onto the warp beam in a single operation and preserve the precision of arrangement and tension, required in first class work, only a narrow section of about one inch width is warped up at a time. Each of these one inch sections must of course have the number of wires called for by the fabric number, for instance 20.70 plain weave has 70 wires, double warp No. 50/100 will have 100, triple warp 70/210 will have 210 wires, etc. In the last case the precaution is usually taken to warp only ½ inch at a time. On the other hand with the coarser weaves it is easy to warp 1½ or even 2 inches. In working to metric standards the section width will be 20-40 or 60 millimeters. These narrow sections of warp are laid up side by side until the total width of the fabric is reached, for example in the 13 ft. fabric mentioned above, of No. 70 plain weave, there would be 156 sections wound onto the beam, one inch wide each.

✦ ✦ ✦

Spooling

THE spools necessary for warping a single section are set up on a "creel", the number of spools warping generally between 80 and 110. The spools are generally arranged two on a spindle, turning in opposite directions so that the rubbing of flange on flange will serve as a friction brake. To add to the breaking effect and get uniform tension on the beam the wires are often led through so-called "lease rods". The tension scheme used in ordinary wire fabric making, of giving the wires one or two wraps around the take-up roll, cannot be employed on high grade Fourdrinier cloth.

✦ ✦ ✦

THE preceeding remarks apply to all systems of warping. In further discussion however distinctions must be made between the four warping systems outlined. We will first consider system No. 1.

✦ ✦ ✦

1. The German System, Conical Direct Onto The Warp Beam In The Loom

THE creel with its spools of wire is set up at the finishing end of the loom, and the one inch wide section of wires brought along over the breast roll and toward the warp beam. The reed and harness are removed or hung up out of the way to give free passage to the warp wires.

✦ ✦ ✦

BETWEEN the rear breast roll and the warp beam there is set up a special warping device which carries a little reed and a little harness, each 4 or 5 inches wide, through which the warp wires are now threaded, practically as they will later be threaded for weaving. For a plain weave, for instance, the first wire will be threaded through No. 1 heddle the second will be between No. 1 and No. 2 the third wire through No. 2 heddle, etc. For easy work a reed is generally used which is much coarser than the operating reed, but when real precision work is to be done a reed is chosen with exactly the correct number of spaces.

✦ ✦ ✦

AFTER passing through the reed the entire section, one inch wide, is tied in a square knot and hooked on to the rack in a slot in the face of the warp beam. A wire has already been secured in this slot, and lead up diagonally along the flange, ready to secure the last end of the ribbon.

✦ ✦ ✦

THE warp beam has a sloping flange at one end, and the other end may or may not be provided with a locking flange. The first section is laid against the sloping flange. For this purpose the warping device described above, with its reed and harness, is arranged as a lathe carriage with a lead screw, so that the ribbon can be traversed for the spiral winding. The warp beam is provided with a special drive for this work, as it must travel a good deal faster during warping than during weaving.

✦ ✦ ✦

AS the warp beam revolves the section is wound on, to the desired length. About 18 inches before the end is reached the section is bound together by weaving in two cross-wires and twisting their ends together. This preserves the order of the individual wires as established by the reed, and facilitates the subsequent threading. Then the beam is turned ahead 18 inches, the section is cut off, and secured by the wire referred to in the second paragraph preceding.

✦ ✦ ✦

NEXT the second section is warped on, just as the first was handled, using the edge of the first section as a cone flange, and this procedure is carried on until the beam is full.

✦ ✦ ✦

2. English Warping System, Straight Laid, Direct Onto The Warp Beam in The Loom

IN this system the procedure is the same as in the German system except that the narrow sections of wires are laid straight upon themselves instead of being coned over against a sloping flange. The beam carries a series of thin partition rings, one inch apart, standing up 2 or 3 inches above the face of the roll. Between 2 of these flanges a section is wound over itself, wire above wire, into a perfect cylinder. The "lathe" is not traversed during the operation.

✦ ✦ ✦

THESE intermediate flanges make it possible to warp up a large amount of wire without any danger of a tangle, but the system has the disadvantage that, regardless of the coarseness of the weave, only one inch can be warped at a time.

✦ ✦ ✦

THE first ends are attached to the beam as described for the German system, and the last ends are tied up with a wire which is secured to the partition flange by a hole near its top edge.

3. Spiral Wound On A Transfer Roll

IN this system the sections are not wound direct onto the warp beam in the loom but onto a heavy wooden roll about 24 inches in diameter which has the arrangements already described for attaching the ends.

✦ ✦ ✦

THE warping of the single sections onto this transfer roll proceeds about as described under System 1. When the two band wires are woven into the section to mark its end, however, they are not cut off but bent back and later woven into all succeeding sections.

✦ ✦ ✦

THE securing of the ends is also different. After weaving in the band wires into the first section these band wires, as stated, are bent back and the roll turned ahead about 18 inches. Before cutting off the section it is bunched and wound with wire, then cut off, the tips bent back, and the section secured to a nail driven into the wooden roll. The next 3 or 4 sections are secured to the same nail. The following sections however must be otherwise secured, as it is not admissible to drive nails into the working face of the roll. As described, each section is woven through with the same two cross-wires which served the first section. After the roll has been turned ahead 18 inches a small piece of wood about 2 inches long, ⅜ inches wide and ⅛ inch thick with rounded edges is slipped under the wire that has already been warped, so that it passes under from 10 to 20 wires. To this bit of wood, as it projects, the next 3 or 4 sections are secured by binding them with a band wire and taking a turn around this projecting stick. Then another stick is worked in and following the sections made fast to it, and so on until the transfer beam is fully loaded.

✦ ✦ ✦

NOW the transfer beam with its load of warp wires is brought up to the finishing end of the loom, and jacked up close to the frame. The ends, of which the first group were secured to the nail and the others to the wooden pieces as described, are now secured to a one inch round rod of the necessary length.

✦ ✦ ✦

ON a stand between the transfer beam and the loom a "comb" is installed, consisting of what is practically a reed with a removable top, 12 reed wires to the inch In this comb the warp wires are so arranged as to make exactly the desired fabric width A wooden top piece is then fastened on the comb Before arranging the wires in the comb the bar carrying the ends is pulled ahead far enough to bring the binding wires past the reed wires After the comb is threaded the one inch bar is replaced by one of a little under ¼ inch diameter, which is slipped under the books of the take-up roll Now the comb is secured to the frame of the loom in front of the take-up roll, and upon the roll at each end is fastened a wooden flange ring to prevent the wires from falling down when they are wound on. The take-up roll is now set in motion by a special rigging and the entire warp is wound off the transfer roll and onto the take-up roll.

✦ ✦ ✦

WHEN the warp is nearly all on the take-up roll, the ends are removed from the hooks in the slot of the transfer roll and secured to a 1 inch round bar, which is allowed to be pulled forward against the comb. The transfer roll is then taken away, the comb is unfastened and, with the bar, is pulled back through the loom. The bar is laid under the hooks in the slot of the warp beam, and the warp is now stretched in perfect order through the loom. The comb is made fast, about 18 inches ahead of the warp beam, flanges are secured on the beam, one at each end, the take-up roll is braked, the warp beam rotated, and the entire warp laid up on the beam.

✦ ✦ ✦

WHERE the design of the loom makes it impossible to run straight from the take up roll to the warp beam, the warp is passed over the front and rear breast rolls, in which case of course the reed and harness are removed or tied up to give it free passage.

✦ ✦ ✦

THE comb is now secured between the warp beam and the rear breast roll, where it helps to keep the warp in order throughout the run of the loom.

✦ ✦ ✦

4. The French System, Straight Lay On A Transfer Roll

THIS is practically the same as the preceeding system except that the wooden transfer roll has division flanges, an inch apart.

✦ ✦ ✦

IN this system however the warp is not generally wound onto the take-up roll. From the transfer roll the wires are threaded back through the reed and the heddles, the ends secured in the slot of the warp beam, and the whole warp wound directly onto the warp beam. The transfer roll is then taken away, the leading ends secured to the take-up roll, and weaving begins at once.

✦ ✦ ✦

WHICHEVER warping system is employed, it must be carried through with extreme care in order to get a uniform warp tension and a good fabric. Any irregularity at the fastenings to the warp beam or take-up roll mean irregularity and perhaps rejection of the fabric.

✦ ✦ ✦

WARPING is often done without the comb. In this case in place of the two ⅜ inch lease rods used temporarily during drawing in, two oval rods are used, about ⅞" wide, by quarter inch thick, with well rounded edges. These rods are fastened behind the rear breast roll. They stay in place during the run of the loom and serve to keep the warp in order and to give warning when a splice or knot is coming. Since however these lease rods affect the warp wires somewhat, causing abrasion or stretching, and since they are apt to spring a little, the comb is much preferable for first quality fabric.

II---Drawing In

AFTER the warp has been put onto the beam by one of the systems described, the wires must be threaded one by one through the harness and the reed. These two elements permit the actual weaving of the fabric, the passage of the filler wires across the warp and the beating up of the filler into its proper place. The warp wires must therefore be threaded into the various harness frames exactly in accordance with the type of weave desired.

✦ ✦ ✦

Reeds

A REED also must be selected of exactly the number of the desired fabric, that is, it must have as many reed wires per inch as the fabric is to have meshes per inch. The reed openings are exactly the size of the warp wires, in contradistinction to the reeds used in common wire fabric, whose openings are much wider than the gauge of the wire so that splices and knots can pass freely. For double and triple warp special reeds must be used, with space for 2 or 3 wires in each opening, and then a narrow opening which runs empty. For the basket weaves also a special reed is used.

✦ ✦ ✦

Heddles

IN the heddle frames which make up the harness are arranged the heddles, which are steel strips about .008 thick and half an inch wide. The silk and cotton heddles formerly used were not durable enough and often wore through and let down the warp wires. Wire heddles also have pretty well gone out of Fourdrinier work, as they have their own weaknesses. The flat heddles must be well polished so as not to scrape the warp wires as they run through the slots stamped out for them.

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THERE must be as many heddles per inch as there are to be wires in the fabric, but they are divided among 2, 3 or 4 frames according to the desired pattern of the weave. In other words the warp is divided into 2, 3 or 4 "sheds" which rise or fall as the various heddle frames are raised or lowered. The order in which threading is done through the heddles will therefore depend on the type of weave to be made. For the plain weave, the cable weave, or the double or triple warp, only two sheds will be threaded, while for the twill and the velvet weaves, which represent the more complicated patterns, there will be four sets of heddles, and in triple twill three sets.

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BEFORE drawing in, the bar to which the warp ends are fastened is brought up to within 4 or 5 inches of the harness, and set down upon a board which is slipped into place temporarily for its support. To simplify the threading, the two band wires which were woven into the warp during the filling of the beam are now replaced by two steel rods about ⅜ inch round.

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IN drawing in, the weaver has to have a helper. The helper takes the wires, in the exact order in which they were warped, twists a loop in each wire with his finger, and loops it onto the weaver's needle, and the weaver pulls it through the slit in the heddle. For this part of the job the weaver stands in between the heddle frames and the reed, and the lay batten is shoved forward to the end of its stroke to give him room. The helper, usually an apprentice, stands back of the heddles.

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WHEN a number of wires have been threaded through the heddles their ends are twisted together to keep them from springing back, and the job goes on until the entire warp is past the harness.

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NEXT the heddle frames are are brought to a common level, the plank moved up onto the lay batten, and the reed is set on it. The weaver takes a heddle in which there is a diagonal slat and sticks it through the reed openings, one after another. The helper loops a wire into the heddle and the weaves pulls each wire through the reed, stopping from time to time to twist together about 3 inches of the warp ends, just as he did in front of the heddle frames. When the whole warp has been threaded through the reed the ⅜" lease rods are pulled out, the lay batten backed up, and the reed secured in its proper place.

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THE twisted ends are then "milked", that is, pulled through the fingers to even up the length, tied in knots, and each knot hung on the rack in the take-up roll.

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THIS method of threading up is practically the same for all four warping systems. The only difference is that in the German and English systems the threading is done one section at a time, while in the other two systems the whole warp is threaded without interruption. This can be done in the case of the German system if the band wires are woven entirely across the warp and the sections fastened to the little wooden insets, as described in the third warping system. In the English system threading is always done an inch at a time.

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Avoiding Loss of Thrums

(A) At the start of weaving.

NORMALLY that part of the warp lying between the take-up roll and the forward end of the stroke of the lay batten is wasted, as no filler wires can be woven into it. To avoid this loss it is possible to carry the warp wires only just past the reed and there fasten them to a piece of sail-cloth or wire fabric. This piece of fabric (called the "false thrum") 5 to 10 feet long, has eyelets on one edge which slip over the hooks in the slot of the take-up roll, and on the other edge hooks to which the knotted sections are secured.

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THERE is a still better way to avoid this waste. The knotted

(*Please turn to page 408*)

Waterbury Button Company Eliminates Waste And Lowers Cost of Production

By W. F. Kayner

President, Waterbury Button Company,
As told to Francis A. Westbrook.

An outline of methods followed to lower cost of production in the manufacture of split or hollow rivets. ▼ ▼

MODERNIZATION, short-cuts and manufacturing economies in general by means of which ways are found of tiding over the depression seem to take a great variety of forms. They differ in each individual plant, depending on the kind of product, existing equipment and many other factors which are rarely, if ever, the same in any two cases. One finds new products, new packages, new processes, new machinery and a host of other expedients which are often very successful. In our own case we have reduced manufacturing costs and have practically eliminated waste by developing new machinery and new processes of production. By making the changes at this time we have given a good deal of work to old employees who would otherwise have had none. Our way of fighting the depression, which is part of the coordinated effort which the manufacturers of New England are making through the New England Council to improve earnings, may, perhaps, suggest something to the reader by which he can profit. What we have done in one of our departments is related, briefly, in the following paragraphs.

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Old Production Methods

PART of our product is copper, brass, aluminum as well as steel bifurcated and tubular rivets, or split and hollow rivets as they are sometimes called. In the past they have in most cases been made in two main operations. First the rivets were turned out on regular headers of the Farrell or Manville type. Up to this point they were solid. Afterward they were sent to drilling and slotting machines and there by hopper feeds they were automatically drilled or slotted. In general it took from two to three drilling or slotting machines to keep up with one header. This was the manufacturing procedure which we set out to improve.

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New Production Methods

WHAT we have done is to develop our manufacturing methods so that we can make the rivets in one operation. It can easily be realized that we have in this way been able to simplify operations and decrease the investment in machinery. The new process does not call for the supplementary drilling or slotting machines which are in themselves expensive and furthermore require considerable upkeep and attention.

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ANOTHER important thing about our new way of manufacturing is that practically all the rivets can be made on one machine in spite of their wide variation in size. One might feel that our process, because of the automatic method of bifurcating or hollowing, would be somewhat slower than the old, inasmuch as this is now all done on the header itself without the use of the extra drilling or slotting machines. As a matter of fact there is absolutely no loss in production whatever, for we can make the complete rivet just as fast as the solid rivet can be made. At first we felt doubtful of this point but, realizing the advantages to be gained if the difficulty could be overcome, we decided to take nothing for granted and to see by actual experiment what could be done. In other words we undertook a little scientific research in which we allowed ourselves to be governed only by incontrovertible facts brought to light by rather exhaustive experiments.

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AS already said this new process has eliminated waste. All of the wire goes into the completed rivet. There is no longer any scrap. There was formerly, in the case of drilled or slotted rivets, in addition to the extra operation and investment, scrap from drilling amounting sometimes to as much as 10% or 15% of the wire used.

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THE upkeep of drills and saws is also done away with, as already pointed out.

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OUR new process is particularly helpful on aluminum rivets, the drilling of aluminum, as every one knows who has tried it, being anything but a nice, clean operation.

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Tooling Requirements

I SUPPOSE one might feel that the tooling-up requirement for this new method of rivet making would be expensive. Such, however, is not the case because the tools can be made in almost the same time required for making the tools used for producing solid rivets.

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Advantage Obtained

STILL another advantage in this new way of manufacturing is that to hopper feed and drill rivets of even fairly good size has always

(*Please turn to page 410*)

Spring Wire Practices in Germany

By Kenneth B. Lewis
Consulting Wire Mill Engineer, Worcester, Mass.

An analysis of a study of German spring wire manufacturing methods recently published in Stahl und Eisen by Dr. Hans Weisecke and translated by the author. In summarizing the author frankly states that the German practices outlined are not readily acceptable in the United States.

A RECENT article in Stahl und Eisen by **Dr. Hans Wiesecke** on the manufacture of spring wire from low-carbon basic steel serves to remind Americans that there is a spring-wire practice in Germany that is practically unknown here. We commonly draw spring wire from patented rods. For a restricted range of purposes a low carbon basic wire can be made into acceptable springs. This German practice lies between the two.

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Patented Stock Makes Best Spring Wire

WITHOUT any question patented stock makes the best spring wire. Not only can the most satisfactory combination of properties be obtained, but the patenting process itself, being continuous, insures uniformity. Rods carrying .45 to .80 carbon are raised to a temperature well above the critical point and cooled at such a rate that the series of transformations in the iron-carbon alloy is halted at the stage of sorbite. This is a strong, ductile, and homogeneous iron-carbon alloy which draws very well. Its tensile strength varies from 115,000 to 160,000 lbs. per square inch, generally speaking, and is controllable by adjusting the amount of carbon, or the speed of cooling, or both. The patenting is done on running strands. A swing through the air provides about the proper rate of cooling for most purposes, but a quenching in a bath of melted lead avoids danger of non-uniformity arising from air currents, and also gives a more flexible control of the tensile strength.

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SORBITE, or in fact any fairly homogeneous structure in the iron-carbon alloys, rises uniformly in tensile strength under cold work. A reduction of the area of cross-section by cold work amounting to 10% raises the tensile strength 10,000 lbs. ——a reduction of 20% raises it 20,000 lbs. By patenting a carbon steel of known composition under controlled conditions and reducing it a measured amount by cold work in wire dies a spring wire of uniform and closely predictable properties can be produced. I have spoken of the tensile strength because it is the property most easily determined by test, and because most of the significant properties of steel bear a constant and known relation to the tensile strength, and as a result of long experience and association we are able to visualize the other properties when tensile strength is mentioned.

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Low Carbon Spring Wire

ANOTHER grade of spring wire is that drawn from low carbon basic or bessemer untreated rods. This stock may carry from .14 to .20 carbon, rather higher when basic, for in bessemer steel the high manganese and phosphorous serve to stiffen the mixture. The best that can be said for this grade is that it is cheap, and for some purposes it seems adequate to the demand. This stock as rolled may

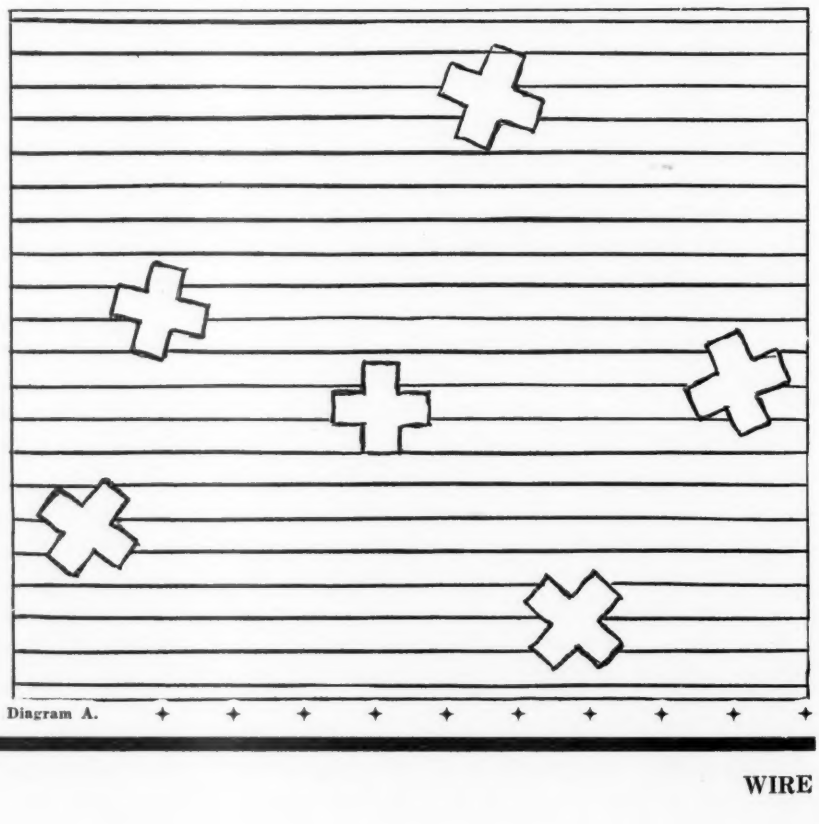

Diagram A.

run 70,000 to 75,000 lbs. tensile. It increases in strength under cold work at a rate faster than normal. Its structure as seen under the microscope is heterogeneous. Patented steel shows a network of sorbite grains. Dead soft basic shows a network of ferrite grains. This inferior spring material however has just enough carbon to spoil the uniformity of the section. Each unit of carbon combines with several units of iron, and this iron carbide teams up with plates of iron into a structure like a plate of sandwiches, so that one unit of carbon can give rise to a mass of this so-called "pearlite" about 15 times its own bulk.

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Dead Low Carbon Steel

DEAD low carbon basic has little particles of pearlite lying here and there along the grain boundaries, but they are so small that their effect in cold drawing can be ignored. This bessemer spring stock however has just enough to make a difference. When it is drawn through dies the homogeneous grains of ferrite stretch out easily but the pearlite is very resistant. It does stretch, but in doing so stiffens a lot more than either sorbite or ferrite. The tensile strength of this pearlite-carrying structure may go up as much as 1400 lbs. for each percent draft, instead of the usual 1000 lbs. Such wire gets springy in a very few drafts. Springs can be made of it and if they are loaded within easy limits they will do a fair job.

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Properties of German Spring Wire

THE German spring wire out of low carbon basic steel gets its properties under an entirely different set of principles. Both grades described above owe their condition to the method of distribution of carbon. and of the resulting iron carbide. The German wire depends entirely on grain size. Its carbon may be as low as .06. To get a good grasp on the reasons for the effect of grain size on physical properties we must dip a little way into current theories.

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WHEN steel is at a temperature above its critical point, roughly 1600° Fahrenheit, the carbon is in solid solution. The material is ready to crystallize, and will do so if left undisturbed. But it is not undisturbed in the rod mill; it is being worked so vigorously that crystals do not start forming until it has come out of the finishing pass and is at rest. At that time, here and there throughout the mass of steel, a crystal will form. Instantly the steel lying nearby will form up into crystals which will attach themselves to the nearest formed crystal or "neucleus", all pointing in the same direction. We will have a lot of colonies of crystals, each colony clustered around the first crystal of its neighborhood like swarms of bees around the queen. Very rapidly the entire mass of steel goes crystalline. But each colony has its crystals pointing in a different direction, or as the scientists say, differently oriented. Just before the last bit of metal goes crystalline these colonies are practically touching each other, and the last few units of metal, in the crack between two "islands" of crystals of different orientation, can't attach itself to either of them, because there is no room in the crack for it to form up into a crystal. The situation is much like that when a crowd of people swarm into a railroad car. Some people can't make up their minds which seat they want, and suddenly they are left in the aisle, for all the seats are taken.

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WHAT happens to this steel which is squeezed out and kept from crystallizing? According to a theory now pretty widely accepted, it sets in an "amorphous" form, a very expressive Greek word which means shapeless. It is this thin film of matter, say the experts, that marks the boundaries between steel grains as we see them under the microscope. The films of amorphous steel are so thin that they cannot be seen, but as the adjacent grains are differently oriented, and reflect light in different ways, the grain boundaries are seen, and we assume each boundary is a film.

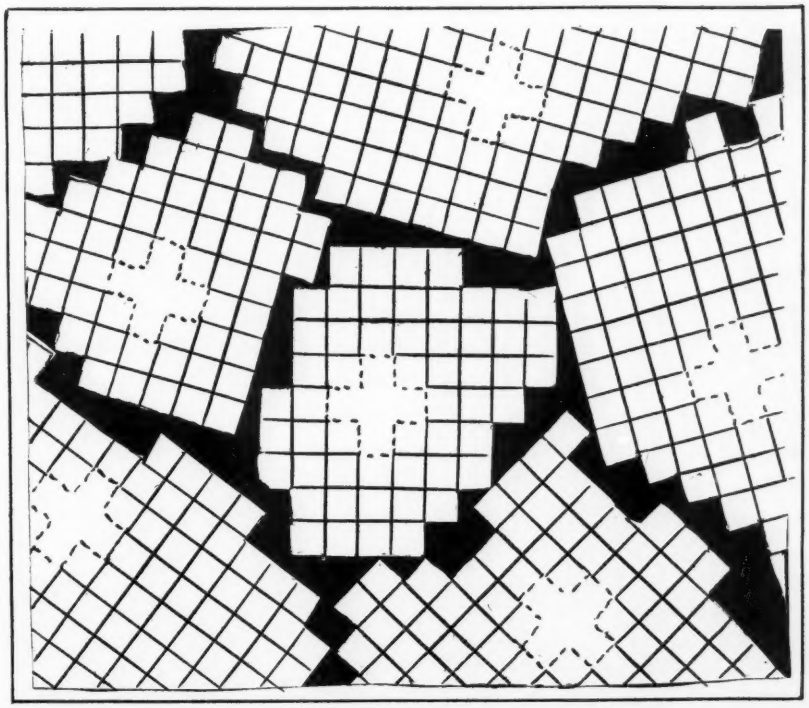

Diagram B.

Action Diagrams

THIS supposed action is shown in the 3 accompanying diagrams, of which A shows a few centers formed up, and beginning to attract metal, B shows practically all the metal clustered in crystals around the original centers, with little cracks between the crystalline groups in which the metal left has not room to shape up with either neighboring group, and C shows how this unit of metal would look under the microscope after the action was complete.

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AMORPHOUS steel is stronger than crystalline steel. This is proved by the fact that when steel breaks the break does not run along the grain boundaries but cuts right across them and right through the crystal grains. This being so, it is clear that the more amorphous steel there is in a piece the stronger it will be. The more grains there are the more film it will take to wrap them all up. In other words, other things being equal, a fine grained steel will have a higher tensile strength than a coarse-grained steel, which everyone knows is a fact.

IT is clear then that there is a way to get a higher tensile strength in steel, other than adding carbon and treating the steel so as to get the carbon into a suitable form. The Germans are taking advantage of the grain size to make a low carbon spring steel. They quench the rods in running water on the reel. The principle is by no means new in this country. Mr. R. H. Smith disclosed in 1922 a method, which has been widely adopted, of increasing the strength of bolts by quenching them in a rapidly flowing stream of water. It is a tricky business, however, and for any degree of success the rules have got to be closely followed. The steel just before it begins to crystallize is in an unstable condition, ready for something to happen. If it is undisturbed, a few crystals will form, widely separated, and all the other metal will group around these few centers, the result being coarse crystals. If however the steel is shocked by a drastic quenching, a large number of centers will form at once, the whole process of crystallization will take place quickly, and with so many centers there will of course be a fine grain. These crystal centers will start to form as soon as you stop working the hot steel, and will keep on until it drops into the critical range of temperature. If the cooling is slow, few centers and coarse grains; if the cooling is fast, many centers and fine grains. Clearly the thing to do is to prevent the start of crystallization until the temperature is very nearly down to the critical point, and then make the process take place very fast. In other words, arrange to have the finishing pass made just above the critical point, and then quench in a fast running stream of cold water.

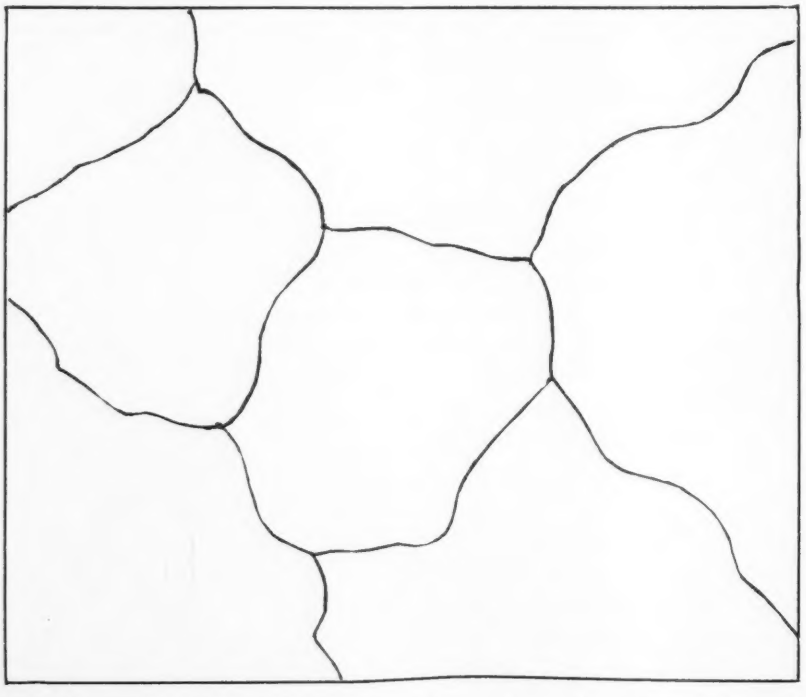

Diagram C.

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IT is difficult to realize the value of time in this connection. The crystals form up very rapidly. If the rod is finished 200° above the critical point no quenching, however drastic, will take heat out of the center of the rod fast enough to get first class results. We are playing with very small fractions of a second. Similarly, if we finish 10° above the critical point and quench in stagnant water, the cooling will be too slow, for an envelope of super-heated steam will form around the rod and insulate it from the water for just the little time necessary for big grains to form. These two points must be observed—have only a short distance to go, and go quick.

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American Objections To German Practice

IT must be confessed that the German practice as described by Dr. Wiesecke does not appeal very strongly to the American taste. The finishing of rods near the critical point takes more power. As described, the rolling is done on looping mills, and in the interests of uniformity, to avoid coarse grain in the first end and a cold-rolled structure in the back end, the bundles are cut down pretty small. Small bundles are also easier to quench, and less likely to "self-anneal". Quenching is usually done by laying the rod direct from the swinging pipe into a container flushed full of water from a 6″ or 8″ pipe. Sometimes the rod is laid dry and dumped into a flushed

(*Please turn to page 409*)

Outstanding Personalities of the Wire Industry

GEORGE A. PAFF, Superintendent of the Rod and Wire Division of the Portsmouth Works, Wheeling Steel Corp., Portsmouth, Ohio, died in the Schirman Hospital, Portsmouth, O., during the last week of September. The immediate cause of his death was angina pectoris.

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MR. PAFF had not been in the best of health for some time and had spent the last two weeks in June at a sanitarium in Battle Creek, Mich. As a result his condition showed some improvement but this proved to be only temporary as he was taken seriously ill during the middle of September and died very suddenly within a week.

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MR. PAFF came to Portsmouth in 1922 from Monessen, Pa. and directed the erection of the rod and wire mill of the Wheeling Steel Corp. and was superintendent from the time of its erection until his death.

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HE was an engineer of wide experience, a member of the Western Pennsylvania Society of Engineers, The Wire Association, and various Masonic bodies. He had been identified with many projects in Monessen and Pittsburgh and was well known in engineering circles in those cities.

GEORGE A. PAFF
Supt. Rod and Wire Division
Wheeling Steel Corp.

He had made a careful study of the production of steel and was highly regarded as an executive at the Portsmouth works of the Wheeling Steel Corp.

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MR. PAFF was a member of the Presbyterian church and a son of Frederick and Louisa Paff, pioneer residents of Alexandria, Va., was born in that city Sept. 14, 1875. He was graduated from Dr. Blackburn's academy there at the age of 20, when he took up engineering as a livlihood. He was united in marriage to Miss Christine Rapp in Newcastle, Pa., June 6, 1900. In addition to the widow, two daughters, Mrs. Mary Louise Miller of Bellevue, a suburb of Pittsburgh, and Miss Gertrude Paff, who is secretary to S. Perley, superintendent of the public schools in Avalon, another suburb of Pittsburgh; and two sisters, Mrs. John M. Reed of Alexandria, Va., and Mrs. Fred G. Dietrich of Washington, D. C., survive.

ROBERT G. SCOTT
Vice President
Revere Brass & Copper Co.

THE appointment of Robert G. Scott as a vice president of the Revere Brass & Copper Co., in charge of the Taunton-New Bedford division with headquarters at Taunton-New Bedford, Mass., has been announced by C. D. Dallas, president of the company.

Mr. Scott has been associated with Revere Copper & Brass, Inc., since its inception in 1929 and was previously connected with the Rome Brass & Copper Company, and Baltimore Copper Mills, both of which are now part of Revere.

He has had a wide experience in the copper and brass fabricating industry. He comes from the executive offices of the company in New York City, where for the past year he has been doing special work of a sales engineering nature. Before this time he was superintendent of the Revere copper rolling mills at Baltimore, Md.

R. B. HOPE
New Superintendent of The Rod and Wire Division of The Wheeling Steel Corp.

MR. R. B. HOPE who has been the assistant superintendent of the rod and wire division of the Wheeling Steel Corp. at Portsmouth, Ohio, for the past several years, has been appointed superintendent succeeding the late George A. Paff.

Mr. Hope also becomes the representative to the Wire Association for the Wheeling Steel Corp.

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J. GORDON GAGE
General Supt. Butler Plant
American Rolling Mill Co.

J. Gordon Gage has been appointed General Superintendent of the American Rolling Mill Co., at Butler, Pa. Mr. Gage joined the American Rolling Mill Company in March 1910. He was made chief electrician in July, 1916 and transferred to Butler as superintendent of maintenance in July, 1929. On January 1, 1931 he was appointed works engineer, the position he held until his present appointment.

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EVANS WARD
President
Russell, Burdsall & Ward
Bolt and Nut Co.

Evans Ward, who succeeds his father, the late William L. Ward, as President of the Russell, Burdsall & Ward Bolt and Nut Co., Portchester, N. Y., is a graduate of Yale, '07. Upon graduation he immediately became affiliated with Russell, Burdsall & Ward, continuing with the company ever since.

After several years at the Rock Falls, Ill., plant, he became general manager of the company in 1914 and vice president in 1923. In addition to his new responsibilities, Mr. Ward will continue as general manager.

Mr. Ward is vice president of the American Institute of Bolt, Nut and Rivet Manufacturers, and a member of the code committee.

Effect of a Backward Pull Upon the Tension Required to Draw Wire

By Professor F. C. Thompson,
D. Met., M. Sc., (The Victoria University of Manchester)

A paper presented before the meeting of the British Iron and Steel Institute outlining the results of experiments to determine the effect of a backward pull upon the tension required to draw wire.

IN a paper published some two years ago in conjunction with Mr. Francis,[1] it was stated that "a backward pull of some considerable intensity may be put upon the wire before it enters the die without causing any increase in the load required to pull the wire through the die. In fact, curious as it seems, the authors have had cases where, when the wire was pulled backwards, it actually reduced the tension necessary to draw it." The actual observations, regarding which there was no possible doubt, clearly demanded further investigation, and it was suggested to the author by Mr. J. Waddington that an explanation might be found in the type of machine with which these tests were carried out.

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THE apparatus[2] actually measures the force applied to the die, which is supported on a lever arm. If a reverse pull be applied to the wire simultaneously with that necessary to draw the wire, the measured quantity will be the resultant.† To investigate the suggestion it was decided to carry out a series of tests on a machine in which the actual pull on the wire was the value measured. This was the slow-speed machine previously described, but slightly modified so as to be no longer dead-loaded. The use of this apparatus had the drawback that the speed of drawing could not be increased much above 3 in. per min., but the results are so consistent, even with very different experimental conditions, that there exists little reason to doubt that they are of general application.

TO the wire being drawn a reverse pull was applied by a dead weight passing over a pulley in the manner illustrated diagrammatically in Fig. 1. For each speed of drawing the variation of the tension necessary to draw the wire was measured against the back tension. Tests were carried out with mild steel and a nickel-silver (7 per cent. nickel), with different speeds of drawing, and with stationary and rotating dies,

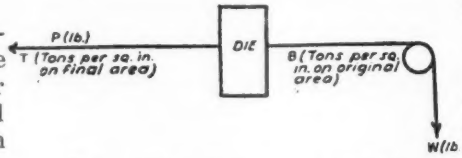

FIG. 1.—ARRANGEMENT FOR TESTS.

the speed of rotation in the latter tests being itself varied.

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THE results were very similar in all cases. As the value of W, the back tension, was increased, that of the direct pull, P, needed to effect the reduction also increased, the relationship of P to W being strictly linear over the whole range of tensions investigated. It is of special interest that the curves show no sign of a break when the value of W attained, as it often did, the yield point of the wire to be drawn. In Fig. 2 and 3 typical curves are reproduced, and in Table I, are collected the results of all the tests in terms of a formula of the type:

$$T = x + yB,$$

where T is the tension, in tons per sq. in. on the final area, required to draw the wire, and B is the backward pull in tons per sq. in. of the original area.

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THE resultant force acting on the die will be $P - W$, and this value—in lb.—is incorporated in both the table and the diagrams. In no case was it possible to carry the experiments beyond the point at whigh $P - W$ becomes pratcically zero, on account of the fracture of the wire prior to entrance into the die under the tensional stress. So small is the pressure on the die around this point that it is quite easy to push the die along the wire, and hence to effect a 20 per cent. reduction of area by hand. It was also noted that a totatory motion of the die greatly facilitated this operation.

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ALTHOUGH, then, the original statement that the application of the back pull does not increase the tension necessary to draw wire is shown to be inaccurate, the work is not without its interest in demonstration how great may be the reduction of the pressure on the die, and hence presumably how its life may be increased. Especially with alloys which are hard and difficult to draw, this fact might conceivably have a certain practical value.

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SINCE these experiments were carried out, an account has been published[3] of some tests carried out on very similar lines in the University of Sheffield, and the results, so far as they go, are in good general accord with those discussed here. In the Sheffild Report, however, an explanation of the differences found between nor maldrawing and that when a reverse tension is applied is sought on the lines of a reduction of the

* Received June 13, 1933.

† It is, perhaps ,not out of place to point out that nothing in the present work necessitates modification of anything so far published by the author and his co-workers on the wire-drawing process, with the single exception of the side issue with which the present note is concerned. Since, however, the statement previously made is inaccurate, it is desirable to clear the matter up at the earliest opportunity.

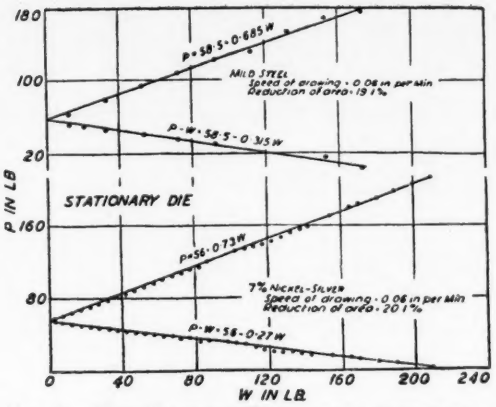
P = 58·5 + 0·685 W
MILD STEEL
Speed of drawing = 0·06 in. per Min
Reduction of area = 19·1%
P = W + 58·5 − 0·315 W
STATIONARY DIE
P = 56·0 + 0·73 W
7% NICKEL-SILVER
Speed of drawing = 0·06 in. per Min
Reduction of area = 20·1%
P = W + 58·0 − 0·27 W
P IN LB
W IN LB

FIG. 2.—WIRE-DRAWING TESTS WITH STATIONARY DIE.

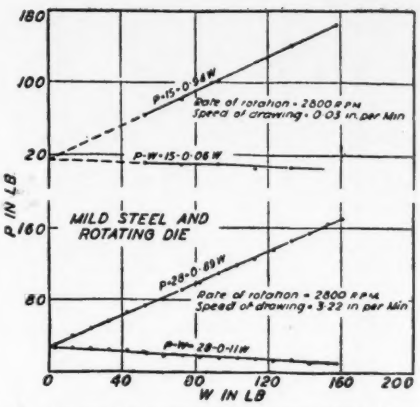
P = 15·0 + 0·94 W
Rate of rotation = 2800 R.P.M.
Speed of drawing = 0·03 in. per Min
P = W + 15·0 − 0·06 W
MILD STEEL AND ROTATING DIE
P = 28·0 + 0·89 W
Rate of rotation = 2800 R.P.M.
Speed of drawing = 3·22 in. per Min
P = W + 28·0 − 0·11 W
P IN LB
W IN LB

FIG. 3.—WIRE-DRAWING TEST WITH MILD STEEL AND ROTATING DIE.

Table I.

P = load in lb. to draw wire, W = load in lb. applied in a direction opposite to P. T = tension in tons per sq. in. on the final area, and B = the back tension in tons per sq. in. on the original area.

No. of Experiment. *Mild Steel.*	*T.* Tons per sq. in.	*P* — *W.* Lb.
1	8.12 + 0.86*B*	59 — 0.31*W*
2	8.9 + 1.0*B*	64.5 — 0.2*W*
3	2.76 + 1.18*B*	20 — 0.05*W*
4	6.9 + 0.96*B*	50 — 0.23*W*
5	2.07 + 1.17*B*	15 — 0.06*W*
6	3.85 + 1.11*B*	28 — 0.17*W*
Nickel-Silver.		
1	7.72 + 0.92*B*	56 — 0.27*W*
2	8.78 + 0.83*B*	63.6 — 0.33*W*
3	4.95 + 0.87*B*	36 — 0.3*W*
6	4.14 + 1.10*B*	30 — 0.12*W*

Test No. 1. Stationary die; drawing speed 0.06 in. per min.
" 2. " " " " 3.22 " "
" 3. Slowly rotating die; " " 0.03 " "
" 4. " " " " 3.22 " "
" 5. Quickly rotating die; " " 0.03 " "
" 6. " " " " 3.22 " "

frictional loss due to reduced die pressure. Mr. Francis and the author have already shown that for conditions similar to those used in the present work, namely, a tungsten-carbide die of 5½° angle, and with the especially good soap used as a lubricant and applied by hand, the coefficient of friction must be very low,(1) and no marked saving on this score is to be anticipated. Further, it is impossible to conceive that the distinct variations of the mechanical properties which the Sheffield workers found are to be associated with anything but some modification of the actual mechanism of drawing.

✦ ✦ ✦

THE present work has not included any examination of the mechanical properties of the wire drawn in the different conditions, and it is, therefore, of special interest that the Sheffield investigation shows that under certain circumstances—when, for instance, the reduction of area per pass is very high—the ductility of the wire may be markedly less when a backward pull is applied than that when the same material is drawn in a normal manner.

THE thanks of the author are due to Messrs, J. Waddington, B.Sc., H. Capper, B.Sc., J. Crowther, B.Sc., and W. B. Lawrie, B.Sc., who carried out the experimental portion of this work.

REFERENCES.

(1) E. L. Francis and F. C. Thompson: Journal of the Institute of Metals, 1931, No. 2, p. 313.

(2) F. C. Thompson and E. L. Francis: Iron and Steel Institute, Carnegie Scholarship Memoirs, 1931, vol. 20, p. 87.

(3) The University of Sheffield, Research Department for the Cold-Working of Steel and other Ferrous Metals, Reports to December, 1932.

A Review of Recent Wire Patents

No. 1,928,727, METHOD OF TREATING WIRE, Patented October 3, 1933 by Charles D. Johnson, Worcester, Mass., assignor to Johnson Steel & Wire Company, Inc., Worcester, Mass., a Corporation of Massachusetts.

So as to increase the elongation and elastic limit or yield point, the inventor proposes flexing the wire progressively from end to end and repeatedly first in one direction and then in another a sufficient number of times to increase the elongation of the wire.

✦ ✦ ✦

No. 1,928,786, WIRE FOLDING AND CUTTING MACHINE, Patented October 3, 1933 by Daniel D. Huyett, Wilmington, Del., assignor to Atlas Powder Company, Wilmington, Del., a Corporation of Delaware.

This machine is adapted to fold pairs of insulated wires attached to electric detonators and leading to the lead wires of blasting machines. The machine is described as an improvement over the patentee's prior U. S. Patent 1,696,121, and in the present machine means is provided to twist the bundle sof wire so that they will retain proper form and will be automatically removed from the winding support.

✦ ✦ ✦

No. 1,929,184, METHOD OF AND MEANS FOR PRODUCING BLANKS FOR ROLL THREADED BOLTS AND THE LIKE, Patented October 3, 1933 by William L. Clouse, Tiffin, Ohio, assignor to The National Machinery Company, Tiffin, Ohio.

According to the construction of this device, an extrusion die or bushing is provided at the rear of gripping die for receiving metal extruded from the blank so as to prevent the formation of extruded portions eccentric to the body of the shank of the bolt.

✦ ✦ ✦

No. 1,929 294, APPARATUS FOR FEEDING FILAMENTS FOR INCANDESCENT LAMPS, Patented October 3, 1933 by Johannes M. van der Poel, Eindhoven, Netherlands, assignor to General Electric Company, a Corporation of New York.

The filament is positively held in a definite position throughout its length during transferring to the lamp, the construction including a pick-up head, a transfer block and a pair of suction fingers to grasp the ends of the filaments.

✦ ✦ ✦

No. 1.929.497, METHOD OF LOCKING WIRES AND LOCKING TOOL FOR USE THEREIN, Patented October 10, 1933 by Augustus H. Kilmer, Cleveland Heights, Ohio.

This tool is adapted to lock spring wires to support wires in cushions, mattresses, etc. Positioning a wire in the lock with a cross wire associated therewith, the tool will force the lock into engagement with the cross wire and effect engagement of the two wires by a movement of the lock while preserving the form of the lock.

✦ ✦ ✦

No. 1,929.812, MANUFACTURE OF INSULATED CONDUCTORS, Patented October 10, 1933 by Charles H. Ellis, Kenmore, N. Y., assignor to General Cable Corporation, New York, N. Y., a Corporation of New Jersey.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents. Address, Wire & Wire Products, 17 East 42nd St., New York.

The method of manufacturing insulating coverings for metallic conductors comprises applying a migratory accelerator to one portion of the covering and a vulcanizing heat for a remote portion of the covering.

✦ ✦ ✦

No. 1,929,930. WIRE BINDING AND TYING MACHINE, Patented October 10, 1933 by Guglielmo Monopoli, Stoke, Nelson, New Zealand.

An object of this invention is to provide a machine which will draw the wire from the coil, place it about a bale or the like, twist the ends and then cut the wire as required.

✦ ✦ ✦

No. 1,929.929. WIRE TIE AND METHOD OF FORMING SAME. Patented October 19, 1933 by Guglielmo Monopoli, Stoke, Nelson, New Zealand.

This tie comprises an elongate loop of wire with parallel sides at one of the wire ends, with the other end lying in overlapped relation with the sides of the loop, the relationship between the three strands being that of a triple, twisted helix.

✦ ✦ ✦

No. 1,930,329, SPRING COILING MACHINE, Patented October 10, 1933 by Washington Vinar, Cicero, Ill., assignor to Burton-Dixie Corporation, Chicago, Illinois, a corporation of Delaware.

This machine is particularly adapted to make coiled wire springs with flat tops having a number of convolutions of wire in the same plane at right angles to the axis of the spring.

✦ ✦ ✦

No. 1,930,336, FOURDRINIER BELT, Patented October 10, 1933 by Edward J. Buell, Niagara Falls, N. Y., assignor to The Lindsay Wire Weaving Company, Cleveland, Ohio, a Corporation of Ohio.

So as to provide a seam in a paper making belt which seam will not mark the paper to an objectionable degree, the method comprises bringing the end weft wires in their entirety together in contiguous relationship, brazing them together and then reinforcing the joint with a lacing wire.

✦ ✦ ✦

No. 1.930,755, NEEDLE MAKING MACHINE, Patented October 17, 1933 by Alfred Hofmann, Palisade, and Oswin Kanis, Lyndhurst, N. J., assignors to Alfred Hofmann Needle Works, Inc., Union City, N. J., a Corporation of New Jersey.

This is described as an improvement upon the inventor's prior U. S. patent 1.696,484, dated December 25, 1928. In the new construction the butt of the needle is formed upon the blank in the early stages of the process of manufacture so that subsequent operations upon the needle will have their true relation with reference to the finished product.

✦ ✦ ✦

No. 1,930,891, WIRE FABRIC, Patented October 17, 1933 by Charles C. Wickwire, Cortland, N. Y., assignor to Wickwire Brothers, Cortland, N. Y., a Corporation of New York.

In this wire fabric, the strands are welded together at the edges of the fabric, thus forming reinforcing and obviating the necessity of salvage wires.

✦ ✦ ✦

No. 1,931,061, COIL WINDING MACHINE, Patented October 17, 1933 by Edward W. Collins, Detroit, Michigan, assignor, by Mesne assignments, to Delco-Remy Corporation, Anderson, Indiana, a Corporation of Delaware.

This coil winding machine includes a head shaft on which is disposed a winding head and two countershafts, each provided with devices for controlling shifting of the wire as it is being fed to the head, one of the shafts being continuously rotated by the head and the other being intermittently rotated thereby.

✦ ✦ ✦

Reissue 18,978, WIRE STRIPPING MACHINE, Patented October 24, 1933 by Walter S. Rotherham, Bloomingdale, N. J., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del., a corporation of Delaware.

The wires are passed through a heated zone of sufficiently high temperature to burn circumferential sections of the insulation around the wires which insulation is thereupon stripped from the ends of the wire.

✦ ✦ ✦

No. 1,931,592, ELECTRIC CABLE, Patented October 24, 1933 by Donald R. Stevens, Ridgewood, N. J., assignor to The Okonite-Callender Cable Company, Incorporated, Paterson, N. J., a corporation of New Jersey.

For the purpose of enabling the cable to hold more oil or other insulating material, the separately insulated wire conductors are surrounded with a closely packed filler of cotton impregnated with liquid insulation filling.

✦ ✦ ✦

No. 1,931.610, ELECTRIC CABLE AND METHOD OF PREPARING SAME, Patented October 24, 1933 by Winters S. Johnstone, Warren, Ohio, assignor, by mesne assignments, to Packard Electric Corporation, Warren, Ohio, a corporation of Delaware.

More particularly the invention lies in the application of indici to the periphery of the electric cable.

✦ ✦ ✦

No. 1, 932,156, PROCESS OF COATING, Patented October 24, 1933 by Albert Jean Ducamp and Marie Emile Alfred Baule, Paris, France.

This is a process of coating metals and comprises mixing distilled castor oil, free from heptylic aldehyde, with undecylenic acid and a metallic oxide (which may be copper oxide or iron oxide) and applying the mixture on the metallic article to be treated, and heating the whole.

(*Please turn to page 413*)

Exports and Imports of Wire

Exports of iron and steel wire products in Sept., 1933 and Sept., 1932
(In gross tons)

	Sept. 1933	August 1933	Sept. 1932
Wire rods	428	1,268	2,313
Hoops, bands and strip steel	1,729	1,939	1,043
Plain black or galvanized iron or steel wire	2,847	3,320	491
Barbed wire and woven wire fencing	3,283	3,807	1,367
Woven wire screen cloth	70	71	44
Wire rope	135	181	104
Insulated iron or steel wire and cable—see analysis below			
Other wire and manufacturers	229	298	128
Wire nails	1,050	1,442	456
Tacks	47	55	23
Other nails, including staples	301	336	117
Bolts, machine screws, nuts, rivets and washers	327	240	223
Total, these 11 classifications	10,446	12,957	6,309

Imports of iron and steel wire and wire products into the United States
(In gross tons)

Concrete reinforcement bars	147	99	1,181
Hollow bars and drill steel	108	54	125
Merchant steel bars	2,559	1,518	1,193
Wire rods	693	1,174	862
Barbed wire	434	347	748
Round iron and steel wire	171	378	107
Telephone and telegraph wire		10	
Flat wire and strip steeel	143	168	88
Wire rope and strand	144	179	132
Other wire	108	189	48
Hoops and bands	2,461	3,303	3,062
Nails, tacks and staples	712	379	762
Bolts, nuts and rivets	3	18	12
Total, these 13 clasifications	7,683	7,816	8,320

Exports of Insulated Wire and Cable
SEPTEMBER, 1933

	Lbs.	Value
Insulated iron or steel wire and cable	1,823	$ 524
Rubber covered wire	283,663	48,267
Insulated copper weatherproof wire	85,889	12,199
Wire and cable telephone cable	6,790	905
Other insulated cooper wire	225,582	61,009
Nickel-Chrome Electric	15,156	17,909
Total, these 6 classifications	618,903	$140,813

THE import trade once more resumed its upward swing and as a result receipts of iron and steel products in September totalled 55,706 tons or 19 percent above the August total. Gains in scrap, ferro-manganese, and pig iron featured this climb which further marked the rise of Canada to the premier position in the list of those countries exporting iron and steel to the United States.

✦ ✦ ✦

EXPORTS in September were 10,575 tons smaller than in August. This circumstance resulted from a decline of 29,609 tons in the shipments of scrap to overseas purchasers—and to the cumulative weight of thirty-five other instances of reduced shipments none of which, however, were in significant amount. On the other hand there were twenty-five increases of which those in galvanized steel sheets (9,150 tons), heavy rails (3,675 tons), skelp (3,637 tons), cast iron pressure pipe and fittings (1,741 tons), black steel sheets (1,693 tons), other plate not fabricated (1,468 tons), welded casing and oil line pipe (1,134 tons), and seamless casing and oil line pipe (1,030 tons).

✦ ✦ ✦

JAPAN was, as usual, the leading market for American iron and steel exports in September, but her total suffered by reason of the reduction in her purchases of scrap. As it was however, 32,493 tons out of her 36,230 ton total was this material and 2,735 tons was tin plate. Canada was the second largest purchaser and increased her total to 16,484 tons of which 4,821 tons was skelp, 4,239 tons was scrap, 1,581 tons was black steel sheets, 996 tons was hoops and bands, and 730 tons was plain structural shapes. The Philippine Islands comprised the month's third market, their total of 6,342 tons exceeding that for the previous month by 844 tons and including 2,483 tons of galvanized steel sheets, 1,003 tons of heavy rails, and 582 tons of black steel sheets. Heavy rails to the extent of 4,988 tons featured the Chilean trade of 5,595 tons which was 5,129 tons above the August figure.

✦ ✦ ✦

RIDING high in large shipments of scrap (13,810 tons), pig iron (6,425 tons), and ferro-manganese (2,160 tons), Canada increased her iron and steel export trade with the United States by 7,479 tons in September to a total of 7,236 tons of pig iron, while Norway followed with 6,055 tons, of which 5,850 tons were ferro-manganese. The Belgian trade of 5,995 tons was next, this total including 1,964 tons of shapes, 1,594 tons of hoops and bands, and 1,398 tons of merchant steel bars. Pig iron—5,737 tons of it—dominated the Netherlands trade of 5,776 tons.

✦ ✦ ✦

CARD clothing imports were smaller. September receipts of this item totaled only 15,690 square feet valued at $19,913—this total being made up of 14,652 square feet ($17,110), received from the United Kingdom, 507 square feet ($1,424) had from France, 494 square feet ($1,059) which came from Belgium, and 37 square feet ($320) from Switzerland.

✦ ✦ ✦

ONLY 20,468 square feet of wire cloth and screening were received in September—this total including 11,023 square feet from Canada, 5,406 square feet from France, 3,589 square feet from Germany and 450 square feet from the Netherlands. The trade of fourdrinier and similar wires increased nearly 50 percent to total 44,570 square feet. Austria was the principal source of supply with a total of 30,620 square feet, other contributors being Germany 9,690 square feet, France 2,360 square

(*Please turn to page 407*)

Wire Association Questions and Answers

Question 1500

What effect has the speed of the drawing machine on the drawing of wire?

Answer 1

The Wire Association:

With reference to yours of the 5th, it will be impossible to make any answer to as broad a question as that set forth in your letter—"What effect has the speed of the drawing machine on the drawing of wire?". I suppose we should be expected to be in position to write a treatise on this subject but when it was all done the question would still remain unanswered, owing to the fact that speed undoubtedly affects the various analyses differently. Probably dies and lubricant have more effect on wire than speed over a wide range. Undoubtedly it is conceivable that speed may be so fast that the structure of the wire will be injured but there are too many limiting factors to high speed at the present time to answer the question as to what the ultimate speed may be.

Generally speaking, from our experience up to date on ordinary steel wire from speeds obtained up to as high as 1800-feet, the change in the physical make-up is very slight. The power varies more or less directly with the speed of a given size. Too high speed off in front presents complications in unreeling or flipping. The inertia fro mtoo high speed causes an excessive throw of the bundle when dealing with weights from 200-pounds up.

✦ ✦ ✦

Answer 2

The Wire Association:

This is rather a difficult question to answer, as various conditions would enter into consideration.

Years ago we used to draw fine copper wire at 500 or 600' per minute: now the speed is eight to ten times with entire success. The old style machine, of course, would not permit this high speed, and there was also the necessity of using a different quality of lubricant and shaping the dies for high speed.

As far as the quality of the finished wire is concerned, to the best of our knowledge we do not think it has deteriorated by the increased speed, but the machine. lubricant and dies have been made to keep up with speed increase.

We feel rather lacking on what the action would be on steel, but, as far as we know, the same would maintain as for copper in regard to the quality of the wire.

✦ ✦ ✦

Answer 3

The Wire Association:

I have your question regarding speed of wire drawing. I do not know of any effect of speed upon the wire, except for secondary effects due to associated evils. High speed causes a considerable building-up of heat at the die, and unless this is suitably dissipated it will affect the wire. Its effect as rule is to raise the tensile and lower the the torsion test. This is a time-temperature effect, and can be largely avoided by cooling the wire promptly on the block.

The film between the wire and die may be destroyed or damaged by heat resulting from high speed. Artificial cooling of the die will control this difficulty.

I hope this answers your question, for I assume that the inquirer is interested chiefly on the effect of speed on the product. It is probable that by observing due precaution drawing speeds can be anything reasonably desired. There are of course various practical difficulties, such as reel speed, action of centrifugal force on blocks, etc. and there always remains the question "Does it pay?"

✦ ✦ ✦

Question 1501

The Wire Association:

Can you get us some information on drawing low carbon bessemer wire on Waterbury-Farrel Continuous Machines with either no coating or else a very light tin coating? We seem to have trouble getting a lubricant which will enable us to draw such wire. Our speed is about 400 ft. per minute. The finished size ranges from No. 18 to No. 20 and the wire is drawn 7 or 8 holes depending on the annealing point.

Answer 1

The Wire Association:

We received your letter relative to lubrication in drawing soft bessemer steel wire at a speed of about 400' per minute. The finished sizes, No. 18 to 20, and drawing 7 or 8 holes, would probably indicate starting at about No. 13 to No. 14.

We are wondering what type of machine they are using for this work. In regard to lubrication, this is a matter in which there is a great deal of variation in different mills. The general requirements for this purpose, however, would be to have the wire annealed at the start and thoroughly cleaned. It is then coated with a liquor finish and drawn out of a rye meal liquor tub.

In regard to the actual lubricant for the wire machine, we hardly know what to recommend, but suggest that your customer get in touch with G. Whitfield Richards, 1732-34 Carlton Street, Philadelphia, Pa., who makes a specialty of wire drawing lubricants both for ferrous and non-ferrous drawing.

With regard to dies, various types are employed, but the new alloy dies seem to give very much better success and with much longer life than the old style steel dies.

✦ ✦ ✦

Answer 2

The Wire Association:

This is rather a difficult question to answer, as various conditions would enter into consideration.

Years ago we used to draw fine copper wire at 500 or 600' per minute; now the speed is eight to ten times with entire success. The old style machines, of course, would not permit this high speed, and there was also the necessity of using a different quality of lubricant and shaping the dies for high speed.

As far as the quality of the finished wire is concerned, to the best of our knowledge we do not think it has deteriorated by the increased speed but the machine, lubricant and dies have been made to keep up with speed increase.

We feel rather lacking on what the action would be on steel, but, as far as we know, the same would maintain as fo rcopper in regard to the quality of the wire.

✦ ✦ ✦

Answer 3

The Wire Association:

With regard to your question about drawing low carbon wire on Waterbury-Farrel continuous machines. My guess would be that the lubricant they are now using is too rich and they should try a palm oil powder which is not a straight soap.

✦ ✦ ✦

Question 1502

The Wire Association:

An analysis of our tin bath shows 1.3% copper. Can you find out for us if this would cause the tinning to come lumpy on the wire? Any information you can obtain would be greatly appreciated.

✦ ✦ ✦

Answer No. 1:

Referring to your inquiry of the 15th, we find that we do have some trouble in our tin bath when the analysis of the bath shows a higher percent of copper as 1.3%. We overcome this trouble by burning green wood, hickory preferred, in the furnace to cleanse the tin bath, and we find that this is an advantage and we readily overcome the trouble referred to in your inquiry.

✦ ✦ ✦

Answer No. 2:

The Wire Association:

In answer to your letter of Nov. 15th regarding the effect of 1.3% copper on the tinned coating of wire, it has not been our experience that this quantity of copper has resulted in a lumpy coating.

During the past year we have made a considerable quantity of tinned wire of different kinds, some of which have been subject to severe inspection but have not run up against lumpy coating.

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Answer No. 3:

The Wire Association:

I have your inquiry of Nov. 15th concerning the amount of copper that the tin bath for wire can stand before becoming unsatisfactory.

I first would say that the ill effects caused from too much copper in the tin are not so much from the fact that the wire comes out lumpy as the fact that

Wire Association Questions and Answers

it has a brassy color. I think that when the analysis of the tin bath shows more than ½ of 1% that inspection should be given to the product with regard to its color of finish and the minute you find the wire coming out anything but the desired white color after the tin shows ½ of 1% contamination the bath should be changed.

In view of the fact that the melting point of copper is 1981° and that the melting point of tin is 450°, it is reasonable to expect that more heat must be applied to the tin bath to keep the bath at the desired temperature. Alloys of tin and copper have higher melting points than pure tin, even though the ratio of tin to copper is as small as indicated in the first paragraph.

✦ ✦ ✦

Cleaning Insulated Wire

STRIPPING the insulation off the ends of electric wiring is one of those jobs for which it is difficult to find a speedy and efficient tool. The one shown here was made from a pair of horse shaeers shears. A 2 in. extension is added to the end of one handle, and a coiled spring attached to it from above and a chain from a 3 ft. lever of 1½ in. pipe below. The shear is clamped in a vise and a wire loop used over the handles to prevent more spread than is necessary. The wire is inserted between the jaws, using a small section of light metal, bolted into the upper jaw, for a stop gauge. The jaws are then closed by placing a foot on the lever, and drawing the wire out strips the end. An operator can develop considerable speed with this device.

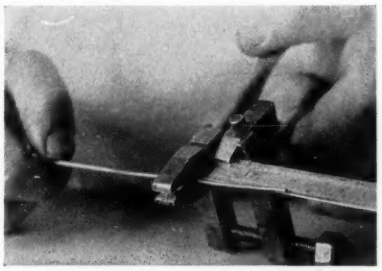
✦ ✦ ✦

Pliers Set Up For Cutting Wire Samples

THE writer occasionally has the job of overhauling a number of machines turning out wire

The Wire Association is for the specific purpose of improving production methods. It was organized as a clearing house of ideas on technical problems and research work in all phases of practical wire drawing and wire working.

The following inquiries were received from and answered by members of the Wire Association. These inquiries are sent to the Secretary of the Association who acts as a central clearing point, and neither the names of the firms or individuals sending in the inquiry, or of the men or firms replying are divulged without permission.

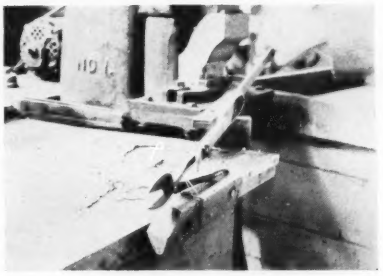


loops used in the electrical domestic trade. When testing these machines after overhaul it becomes necessary to cut off a good number of short pieces of wire of various lengths by hand. I thought that cutting off the wire by measuring it and then using the pliers in the usual way was rather a nuisance so I rigged up my pliers so I could measure and cut direct. Although this particular job may not become part of the duty of many readers it occurred to me that since the idea worked so well for me it might be just as useful on some other similar work.

✦ ✦ ✦

I USE one small and one large machinists parallel clamp. I hold the scale in the small clamp right up against the cutting jaws and secure there with the large clamp, just as the photo shows. The small clamp is set so that it tightens up against only one half of the pliers, so that the latter will open and close freely. I present this kink because I have found it a little time and trouble saver in the circumstances mentioned above.

Extension Handle for Hand Shears



A PAIR of common hand shears may be used for heavier metal and with greater ease by fastening them to the edge of the work bench and using an extension handle. This is a light bar with the end wired to the upper shank of the shears and a slight S bend where it passes through the loop handle.

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Opening Micrometers Quickly

A STOREMAN whose work mainly consisted of measuring wire and cold rolled steel with micrometers spent a great part of his time opening and closing them. To save this and avoid the sore fingers produced by continually turning the barrel in the ordinary way, he mounted a rubber tired wheel a running fit on a bolt in the end of the bench where he worked. One twirl of this wheel will open or close a micrometer in a flash as the knurled portion of the barrel is pressed against it as shown on the accompanying photo. With practice the "Mike" can be lifted off the wheel within a few thousandths of the dimension required.

'Round the World With the Wire Industry

Continental Steel Cartel

THE close agreement among the members of the Continental Steel Cartel has now been threatened by the Belgian Forges de Clabecq, which joined the Cartel and its selling organizations provisionally to the end of 1933. At a recent meeting of shareholders, the chairman of the concern stated that four months after the re-constitution of the Cartel the output of the concern had been so far reduced that a big increase in the cost of production and a material diminution in the profits had taken place as compared with the second half of 1932. Employment had also seriously declined, and for these reasons, if no change occurred before the end of the year, the company would be compelled to cancel its membership as from December 31.

The withdrawal of the company from the Belgian Cosibel group would seriously endanger the future existence of the latter and also that of the Cartel itself. It is believed that the other Belgian steelworks will seek to reach an understanding with the Forges de Clabecq to avoid a possible break-up of the Cosibel.

The selling organizations of the Cartel have resumed negotiations with the Belgian finishing mills with a view to their inclusion and a transfer of all finished products to the selling organizations for disposal, thus centralizing the selling arrangements. An agreement appears to be imminent.

The managing committee of the selling organizations met in Paris on Cctober 11 and discussed various internal questions, including rebates to merchants, the organization of markets, and currency matters. No changes were made in the basis prices.

A further meeting of the Cartel took place at Luxemburg on October 14. The relations between the international selling organizations and those export merchants with whom the comptoirs have regular connection were discussed, as well as the formation of a comptoir for wide flanged joists, as many new works are now making this type of joist and certain difficulties have arisen.

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French Export Trade In Iron And Steel Products

FRENCH exports of iron and steel products during the first eight months of the current year amounted to 1,714,563 metric tons. The principal items entering this trade were bars with a total tonnage of 794,647 tons; ingots, blooms, billets and slabs 213,490 tons; wire rods 93,125 tons; hot and cold rolled strip 75,748 tons; and wire 43,489 tons. Germany afforded the largest market for French iron and steel during this period while large tonnages were also shipped to the United Kingdom, Belgium-Luxemburg, Switzerland, Algeria, Tunisia the Netherlands and to Japan.

✦ ✦ ✦

New Alloy Has Treble Fatigue Resistance of Lead

EXPERIMENTS have just been completed by a prominent British metal concern in the manufacture of tellurium-lead alloy. It is claimed that this new material has important commercial advantages over ordinary lead. Tellurium-lead is now available on the market and orders have already been received for some hundreds of tons in place of ordinary lead.

From a domestic standpoint, one of the most interesting claims for the new alloy is that in the form of pipes it has twice the resistance of an ordinary lead pipe to bursting by frost. The vibration or fatigue resistance of tellurium lead as determined in a fatigue-testing machine is stated to be three times greater than that of ordinary lead, and this is regarded as specially significant in connection with stresses such as are enocuntered in ships, cables, viaducts, etc. No doubt more will be heard of this alloy in the field of cable manufacture.

✦ ✦ ✦

Improved Cable Sealing Chamber Evolved

A REMARKABLY cheap and convenient method of combining cut-outs, neutral boxes, etc., with a cable-sealing chamber, has just been patented by Callenders Cable & Construction Co., Ltd. The incoming cable enters the bottom of the sealing chamber, which is split vertically and has a rectangular opening, normally in a horizontal plane opposite the cable entry. Neutral boxes, cut-outs, etc., are made in units with bottom flanges to fit on this rectangular opening. The units and the sealing chamber are fastened to a common backboard. The front half of the sealing chamber is removed while the connections are made; it is then replaced, and the neutral box is removed to enable the chamber to be filled with compound, and is refitted while the latter is still hot.

✦ ✦ ✦

Import Embargo On Steel Denied

THE Treasury Department on November 16th declined to issue anti-dumping orders on steel products from Germany, France and the Saar Basin, as requested by the domestic steel industry.

✦ ✦ ✦

IRON and steel products importers had denied before the Customs Bureau charges of unfair competition of their products, made recently by domestic producers.

'Round the World With the Wire Industry

THEY denied that the domestic industry was being seriously affected by foreign iron and steel, asserting that total imports amounted to less than 2 per cent of the entire American consumption, and made the counter charge that American producers were guilty of dumping in foreign markets.

✦ ✦ ✦

German Steel Merger Planned

UNDER the terms of the new proposed German steel merger, each company will retain its own identity but will have a well defined field based on its manufacturing possibilities. The organization is designed to eliminate overlapping and unprofitable business through the confinement of each company to the market best suited for its equipment.

✦ ✦ ✦

UNDER the merger plan, the Government will have indirect control through bank holdings and beside steel mills and iron foundries, it is proposed to include coal and coke plants. The companies in the merger will include Gelsenkirchen Mining Corporation, United Steel Works, Phoenix Steel and Mining, and the Van der Zypen Companies and the capitalization will be between $200,000,000 and $240,000,000 at present exchange rates.

✦ ✦ ✦

German Wire Producers To Fight For Export Markets

THE IWECO has reduced export prices for wire products heavily. The IWECO now under a new board of directors has decided to take up the fight with countries having a depreciated currency. From all domestic transactions a certain percentage (2-4%) will be paid in cash for allowing cheaper exports. The price for wire nails was reduced by shillings 5-7/6 per ton; for ordinary steel wire (galvanized) by shillings 8-10; for barbed wire as much as shillings 20/ per ton, as in this product American competition is keenest. For certain markets, where the IWECO does not meet such a keen competition the reductian is smaller but in Central America the reduction is up to shillings 22/6 though the average is shillings 20/ per ton. The Japanese competition in wire nails is not as keen at the moment as it used to be before. Many customers are dissatisfied with the Japanese quality and besides this the Japanese prices have recently been heavily advanced. Japanese wire nail prices used to be up to 20% cheaper than the IWECO; now the difference is 4-6%. The IWECO reports that the export turnovers show a small improvement.

✦ ✦ ✦

German Export Duty On Used Wire Machinery

THE German Government has imposed an export duty on used wire machinery. The export duty is from 40 to 80 Marks per 100 kilograms in weight. The duty has been imposed in order to make it more difficult for German wire manufacturers to shift their whole plant abroad. This had been done in a few cases during the last two years, when such plants were transported in their entirety to Great Britain, Palestine and Japan. On the other side it was possible for foreign buyers to get used German wire machinery from closed down plants at ridiculous prices and with such low instalment payments that they were able to compete much better against the German industry in their own markets. The high export duty will make such transactions very difficult.

Exports And Imports

(*Continued from page 403*)

feet, and Sweden 1,900 square feet.

✦ ✦ ✦

THE trade in wire fencing and netting was greatly increased in September when imports of that galvanized before weaving totaled 6,683,208 square feet and that galvanized after weaving 3,232,599 square feet. The first named quality was had from Germany (4,083,000 square feet), Belgium-Luxemburg (1,413,875 square feet), and the Netherlands (1,186,333 square feet), while the latter grade came from the same three countries—Germany (2,544,707 square feet), the Netherlands (452,892 square feet), and Belgium (235,000 square feet).

✦ ✦ ✦

IRON and steel wood screws during September were exported to the amount of 23,994 gross, valued at $4,159. The principal purchasing countries were the United Kingdom, Costa Rica, Cuba, Colombia, and Philippine Islands.

✦ ✦ ✦

BRASS wood screws were exported to the amount of 3,738 gross, valued at $1,332, the principal purchasing countries being the Philippine Islands, Cuba, Canada and Costa Rica.

✦ ✦ ✦

IMPORTS of wood screws to the United States during the month of September amounted to 22,800 gross, valued at $1,654. Of this amount 22,730 came from Sweden.

Information Service

Improvements in processes and methods of production for rod, wire, strip and insulated wire and cable are being constantly made.

Technical processes of production are being developed consistently.

To members of the Wire Association an information service is available by which they can obtain data on any subject relating to the industry on which they desire information.

WHY DON'T YOU JOIN THE WIRE ASSOCIATION:

ADDRESS THE SECRETARY

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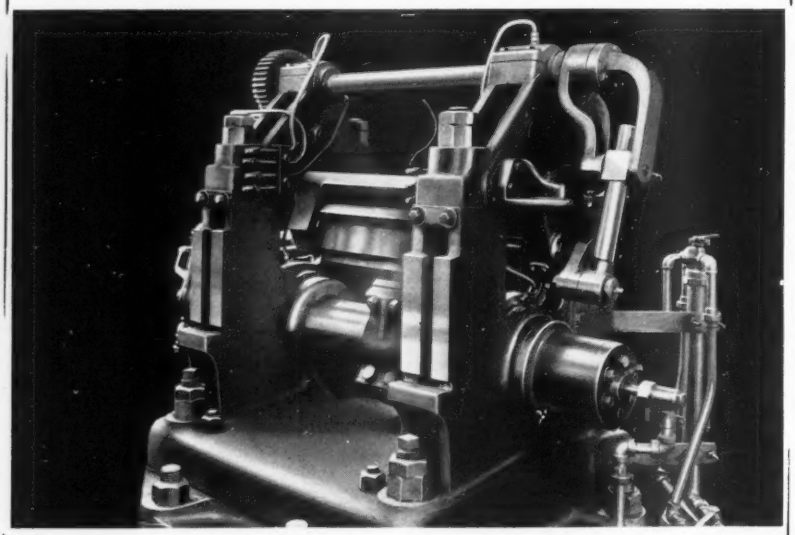

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THE LEWIS FOUNDRY & MACHINE CO.
BOX 1591
PITTSBURGH, PA.

Warping And Drawing In For Fourdriner Fabrics

(*Continued From Page 394*)

sections are lying just in front of the reed. A long stout card is fastened to the outer ribbon, passed around one of the hooks at the take-up roll, back to the next section to the next hook, and so laced back and forth in a zig-zag pattern This hook-up has an advantage over the fabric connection in that the tension can be more easily equalized between the ribbons. This equalizing of tension is left to the "feeling" of the weaver, and adjustment is made by laying strips of paper between the rear breast roll and the warp

The use of this lacing or of the piece of fabric as described, which is applicable to any warping system, makes it possible to weave right up close to the warp ends, as they are so close to the reed that the loss is only a few inches. The fabric or lacing is taken out and the new fabric hooked direct to the take-up roll as soon as it is long enough to span the distance. It is of course understood that in order to keep a uniform tension and avoid a wide spacing in the filler, certain precautions must be taken when making this shift. The lay must be at the end of its stroke, the heddle frames must be evened up, and the warp tension must be slackened by regulating device. After the false thrum is removed and the new fabric hooked to the roll the original tension must be carefully restored. Any irregularity can be overcome by using strips of paper between the breast beam and such of the warp wires as are slack.

✦ ✦ ✦

(B) At the end of the run.

WHEN the warp runs out there will normally be a further loss, as no filler wires can be woven between the heddles and the warp beam. It is possible to avoid this loss, but the job is undertaken only in the case of high-priced wires, as for example cable wires. It is done by hooking in between the warp beam and the ends of the warp fabric, rope slings with eyelets in both ends. The section

ends are taken off the warp beam and turned up into a loop. Through all the loops a one inch steel bar is threaded. The rope slings are slipped around this bar and their eyelets hooked into the rack of the warp beam. These rope slings, whether of wire rope or hemp, must be of exactly the same length and must have a slight but uniform stretch.

✦ ✦ ✦

BY the use of these slings filler wire can be woven right up to the end of the warp, with the loss of only an inch or two. Care must be taken that the uniformity of tension is maintained, so that there will be no wide space among the fillers The precautions have already been noted in connection with the treatment of the front end of the fabric.

✦ ✦ ✦

Spring Wire Practices In Germany

(*Continued from page 398*)

trough. Steel which under normal handling would show 50,000 to 55,000 tensile can be quenched to 80,000, 85,000 and in some cases as high as 110,000 lbs. Such rods, drawn 2, 3 or 4 drafts behave normally and show such changes of properties under cold work as would be expected of an unquenched steel.

✦ ✦ ✦

WHETHER this low carbon spring wire would appeal to a sizeable market in the United States is problematical. Dr. Wiesecke complains of its non-uniformity, and non-uniform spring wire is not likely to make many friends. Not only does the resulting fabric suffer, but constant adjustments are necessary on the spring coiling machines, which are set to make convolutions of predetermined diameter predicated on uniform temper. Still there are impressive savings in sight, including the cost of patenting as well as the differential between high and low carbon rods.

✦ ✦ ✦

ONE thing is certain; the rod mills of this country are as a rule much better fitted to quench this basic stock than those of the Continent. Although our mills are practically all of the continuous

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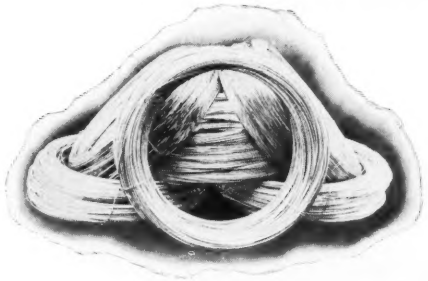

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✦ ✦ ✦

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BRIGHT BASIC
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TINNED
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Paralan will give your finished wire and wire products protection from atmospheric corrosion in the mill and in shipping. Paralan-coated wire can be spot welded or soldered without cleaning. Also, Paralan leaves surfaces in good condition for all types of finishes—enameling, japanning, lacquering, plating, etc.

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(Patents pending)

For panning rubber covered wire before vulcanization.
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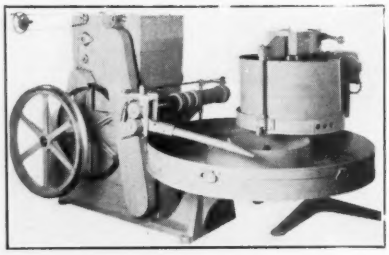

EST 1855 AIMCO INC. 1915
"American" INSULATING MACHINERY COMPANY
517 West Huntington St.
PHILADELPHIA PENNSYLVANIA U.S.A.

type, high speed, capable of delivering a finished rod at practically the billet temperature, many of them are equipped, and the rest easily can be equipped, with spray nozzles using high velocity water under close regulation, by the use of which the rod can be delicately controlled in its temperature at all points in its progress. The modern continuous rod mill with spray nozzle equipment is practically a high speed heat treating plant, capable of delivering steel to the reels with a specified Brinell hardness, tensile strength, and even a specified grain count. It is easily possible through the use of pressure spray nozzles to deliver rods out of the reel pipes too stiff to lay on the coil plate. If the product were sure of a market there is not the slightest doubt that our American rod mills could deliver an excellent fine grained and uniform product in bundles ranging from 300 to 450 pounds each. The rods could be quenched down, before the last pass, to finish barely above the critical temperature, then suffer a further and practically instantaneous quench to a point at which they would be just capable of being laid on the coil plate. A coil plate submerged in turbulent cold water would check any tendency toward self annealing.

✦ ✦ ✦

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ROOMS from $2.50 SUITES from $6.00
IN THE HEART OF TIMES SQUARE

Waterbury Button Co., Production Methods

(*Continued from page 395*)

been an extremely expensive proposition and this has been obviated. Furthermore it is almost impossible to properly hopper feed the large numbers of tiny rivets which we make, particularly those of certain shapes.

✦ ✦ ✦

OF course it may be said that our manufacturing is a highly specialized branch of the metal industry and that therefore what we have tried to do has little bearing on what any other manufacturer can do to strengthen his position. Actually that has nothing to do with the general problem of lowering costs of production or introducing a new line to meet new conditions. During the depression of 1892-3 we made the climbing monkey toy which took the public fancy by storm so that we worked day and night and kept two other plants in the city working for us. This certainly was special but we had the means of making it and actually was easy enough. As a matter of fact every manufacturer has his own highly specialized processes, or thinks he has. The only important thing is to look over one's own plant with a dispassionate eye, pick as many flaws in it and its output as possible and then see what can, in one way or another, be done.

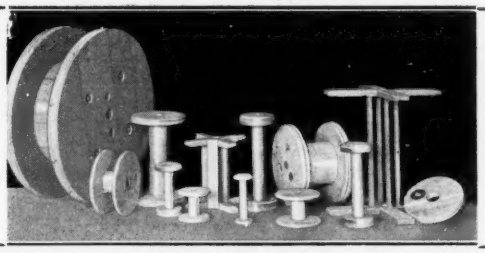
✦ ✦ ✦

I EXPECT that as time goes on we will keep on improving our processes and products and doing other things, including the introduction of new products, to keep abreast of the times as they continually change. We had a good chance to improve our housekeeping with a new product in 1892 and at this juncture by improved processing, from which we have already profited to some extent. Our sales this year are only 8% less than last, which is considerably better than the average in this vicinity.

✦ ✦ ✦

NOW we are ready for the upturn and can take care of any demand that is at all likely to be made on us. Looking ahead and planning for the future has made us much happier and more capable of dealing with the situation which everyone must face squarely.

WOODEN SPOOLS REELS and BOBBINS For WIRE and CORDAGE MILLS



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A. S. T. M. Announces New Issue of Book of Standards

THE American Society for Testing Materials has just issued its Book of A. S. T. M. Standards, a triennial publication containing all of the standard specifications, methods of test, recommended practices and definitions formally adopted by the Society. The 1933 issue of this publication is composed of two parts—Part I containing all A. S. T. M. standards covering metallic materials; Part II, all standards relating to nonmetallic materials. Both parts aggregate 2300 pages.

IN both parts of the book, the specifications for a particular class of material are given first, followed directly by the test methods, definitions, etc. A complete subject index is included in which each standard is indexed under the principal subject covered, keywords being given in alphabetical sequence. This index, together with two tables of contents, one listing standards by the materials covered, the other in order of numeric sequence of the designations greatly facilitates the use of the book.

OF the 185 standards in Part I, 104 cover the ferrous metals, steel, wrought iron, pig iron and iron castings and ferro-alloys, while 70 relate to non-ferrous metals, solder metal, deoxidizers, magnesium alloys, copper and copper alloys, lead, nickel, zinc, bearing metals, solder metal, deovxidizers, electrical-heating and electrical-resistance alloys Eleven of the standards involve metallography and general testing methods.

✦ ✦ ✦

IN the section of Part I devoted to ferrous metals, the following particular classes are covered by one or more standards:

Structural and Rivet Steel
Boiler Steels
Steel for Welding
Concrete Reinforcement Steel
Commercial Bar Steels
Steel Rails and Accessories
Spring Steel and Springs
Steel Blooms, Forgings, Axles
Steel Wheels and Tires
Steel Castings
Steel Tubes and Pipe
Steel for High-Temperature Service
Tool Steels
Zinc-Coated Steel Articles
Wrought Iron
Pig Iron and Castings
Ferro-Alloys

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ROUND AND SPECIAL SHAPES

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The crack trains, which pay best, are trusted solely to men, who have learned from—*Experience*.

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WIRE DRAWING SOAPS
FOR EVERY PURPOSE

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THE 70 standards relating to non-ferrous metals are grouped according to the following classifications:

Aluminum and Magnesium Alloys

Copper and Copper Alloys (copper ingot; brass and bronze; copper and brass plates, tubes, rods, etc.; copper wire and cable)

Lead

Nickel

Solder Metal

White Metal (Bearing Metal)

Zinc

Deoxidizers

Electrical-Heating and Electrical-Resistance Alloys.

✦ ✦ ✦

OTHER standards in Part I cover grain size for classification of steels, metallographic testing of steel and of non-ferrous metals and alloys, thermal analysis of steel, radiographic testing of metal castings, Brinell hardness testing and tension testing of metallic materials and definitions of terms relating to (1) metallography, (2) methods of testing and (3) specific gravity.

✦ ✦ ✦

ALSO the following zinc-coated (galvanized) iron or steel products: Telephone and telegraph line wire, tie wires, wire strand (cable) and chain-link fence fabric. The recommended practice for thermal analysis of steel and the grain size chart for classification of steels were also adopted as standards in 1933.

✦ ✦ ✦

INCLUDED in the 285 standards contained in Part II—Non-Metallic Materials—are specifications and test methods covering 37 new standards.

✦ ✦ ✦

Copies of the book can be obtained from A. S. T. M. Headquarters, 1315 Spruce Street, Philadelphia, Pa., at the following prices: Either part, $7.50; both parts, $14.00.

A Review of Recent Wire Patents

(*Continued from page 402*)

No. 1,932,454, METAL DRAWING, Patented October 31, 1933 by Russell Franks, Jackson Heights, N. Y., assignor to Electro Metallurgical Company, a Corporation of West Virginia.

More specifically the invention lies in a new method of lubricating in wire drawing, the method comprising coating the metal with a vehicle containing scale-like particles of aluminum, hardening the coating into a tough adherent film, and then drawing the metal through a die.

✦ ✦ ✦

No. 1, 932,491, WIRE DRAWING APPARATUS, Patented October 31, 1933 by John R. Shea, Maplewood, N. J., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

This wire drawing apparatus is of the type where type sets of drawing capstans are provided for advancing the wire through two separate sets of dies. The capstans rotate at different rates of speed and die supporting means are provided associated with each capstan and adapted to oscillate so as to impart a circular motion to each of the dies.

✦ ✦ ✦

No. 1,933,112, MULTICORE HIGH TENSION ELECTRIC CABLES, Patented October 31, 1933 by Christian Held, Berlin-Charlottenburg, Germany, assignor to Siemens-Schuckertwerke Aktiengesellschaft, Berlin-Siemensstadt, Germany, a corporation of Germany.

In the construction of this cable corrosion cannot take place between the lead and the armoring material.

✦ ✦ ✦

No. 1,933,266, WIRE TAPE, Patented October 41, 1933 by Charles D. Johnson, Worcester, Mass., assignor to Johnson Steel & Wire Company, Inc., Worcester, Mass., a corporation of Mass.

The wire tape covered by this patent is such as is employed in tire casings. In the specific construction each wire is prevented from turning and twisting relative to the other wires.

✦ ✦ ✦

No. 1,933,317, CLINCHING WIRE NAIL, Patented October 31, 1933 by Edgar H. Curtis, Framingham Center, Mass., assignor to Charles F. Baker & Co. Inc., Boston, Mass., a corporation of Mass.

This nail is adapted for shoe making and is constructed so that it will cause but very little injury to the material worked upon. The construction includes a sword-like point and a plurality of opposed diagonal grooves in the periphery of the shank.

✦ ✦ ✦

No. 1,933,332, SCREW, Patented October 31, 1933 by Donald M. May, Bayside, N. Y.

An initially complete and self-locking tapered screw is provided comprising a shank having a screw thread and incorporated therewith a holding spur projecting from the shank beyond the track described by the elements of the screw in the driving of the same into the material in which the screw is used, the leading edge of the spur being inclined tangentially away from the axis of the screw in the direction of driving rotation.

No. 1,933,433, ROTARY WIRE DRAWING DIE, Patented October 31, 1933 by Arthur C. Hjelm, Worcester, Mass., assignor to The American Steel and Wire Company of New Jersey, a corporation of New Jersey.

In this construction, means are provided for enabling the wire being drawn to rotate the die so that extraneous power is not necessary.

✦ ✦ ✦

No. 1,933,533, TREATING RODS AND WIRE, Patented October 31, 1933 by James S. Phifer, Allentown, Pa., assignor to The American Steel and Wire Company of New Jersey, a corporation of New Jersey.

This machine is adapted for cleaning and preparing rods for wire drawing. Separate chambers are provided for pickling for sulling and coating with lime and for baking the wire rod and means is also provided for handling the rod to promote its passage through the several treating devices.

✦ ✦ ✦

Enquirer wishes to have details of a small wire weaving plant for sale.

✦ ✦ ✦

Indicate number and size of looms and sales terms with lowest prices. Replies to Box No. 1, c/o Wire & Wire Products, 17 E. 42nd St., New York, N. Y.

EFFICIENT PICKLING
REQUIRES "RODINE"

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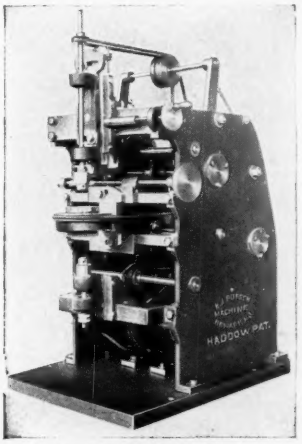
ZINC WIRE
STRIP ZINC
EYELETS
THE PLATT BROS. & CO.
WATERBURY, CONN.

Soil Heating Cable

TWO out-of the-ordinary installations of soil-heating cable have been made by Cleveland industries, according to General Electric engineers. The cable—nickel-chromium wire covered with asbestos, taped with varnished cambric, and encased in a lead sheath for protection from moisture—is designed primarily for horticultural and agricultural uses.

A steel plant had difficulty in the winter time with its lubricant for roll-neck bearings, which congealed in the pipe lines. Formerly a steam pipe or air duct was nested with the pipe lines; now soil-heating cable has been wound around the pipes and insulation applied. An automatic, adjustable thermostat maintains the temperature of the lubricant at the proper point, irrespective of the weather conditions.

Another installation is in a paint plant laboratory, where soil-heating cable has been installed in a water bath which is used to maintain constant humidity for testing paints in a saturated atmosphere.



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Subsidiary of
Thomson-Gibb Electric Welding Co.
Lynn, Massachusetts.

Simplification For Copper Wire Nails Approved

SIMPLIFIED Practice Recommendation R150-33, Copper Wire Nails, has been accorded the required degree of written approval by the industry, and is to become effective December 1, 1933, according to an announcement by the Division of Simplified Practice, Bureau of Standards.

This recommendation which was proposed and developed by the industry covers the length and gauge of common copper wire nails with flat heads and copper wire slating nails.

The recommendation represents a substantial reduction in the variety heretofore listed for regular stock purposes.

✦ ✦ ✦

New Coupling Bulletin

"Farrel Gearflex Couplings" is the title of an attractive new bulletin, No. 437, describing the flexible couplings manufactured by the Farrel-Birmingham Company, Inc., 437 Vulcan St., Buffalo, N. Y.

The bulletin is 8½"x11" to fit standard binders and files, and is done in two colors, with numerous illustrations, diagrams and tables of ratings, dimensions, weights and list prices, as well as complete descriptive matter and information for ordering or inquiring for "Gearflex" Couplings.

A copy of the bulletin may be obtained free on request to the company's office at Buffalo, N. Y.

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For more complete information, consult the annual Directory, Index & Buyers' Guide.

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See Furnaces—Various Headings

ANNEALING POTS AND BOXES
Scudder, E. J., Fdry & Machine Co., Trenton, N. J.

ARMORING EQUIPMENT
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

BAKERS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CASTINGS—Wire Mill
E. J. Scudder Foundry & Machine Co., Trenton, N. J.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.

CLEANING & PICKLING EQUIPMENT
Broden Construction Co., Cleveland, O.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

COATING—Protective
American Landolin Co., Lawrence, Mass.

COILERS—Sheet and Wire
H. J. Ruesch Machine Co., Newark, N. J.

CRANES—Wire Mill
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

DIES—Diamond
Balloffet Diamond Wire Dies Co., Inc., N. Y. C.
Cochaud Wire Die Co., New York.
Driver-Harris Co., Harrison, N. J.
Vianney Wire Die Works, New York.

DIES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Cochaud Wire Die Corp., New York.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Vianney Wire Die Wks., N. Y.

DIES—Rod and Tube Drawing
Bissett Steel Co., Cleveland, O.
Carboloy Co., Inc., Newark, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Tantalum Carbide
Bissett Steel Co., Cleveland, O.
Kelly Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DIES—Tungsten Carbide
Bissett Steel Co., Cleveland, O.
Carboloy Co., Inc., Newark, N. J.
Driver-Harris Co., Harrison, N. J.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Vianney Wire Die Works, New York, N. Y.

DRAW BENCHES
H. J. Ruesch Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

ENGINEER—Consulting Wire Mill
Jagielski, Otto, Yonkers, N. Y.
Lewis, Kenneth B., New York, N. Y.

EYELETS—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FURNACES—Annealing
Electric Furnace Co., Salem, O.

FURNACES—Automatic
Electric Furnace Co., Salem, O.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, O.

FURNACES—Electric
Electric Furnace Co., Salem, O.

FURNACES—Lead Melting
Electric Furnace Co., Salem, O.
John Robertson Co., Brooklyn, N. Y.

FURNACES—Non-Oxidizing
Electric Furnace Co., Salem, O.

FURNACES—Wire
Electric Furnace Co., Salem, O.

GALVANIZING ENGINEER
W. H. Spowers, Jr., New York, N. Y.

INHIBITORS
American Chemical Paint Co., Ambler, Pa.
Wm. M. Parkin & Co., Pittsburgh, Pa.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LIME—Pulverized
Amer. Lime & Stone Co., Bellefonte, Pa.

LUBRICANTS—Wire Drawing
Drakefield, B. F., & Co., New York, N. Y.
R. H. Miller Co., Homer, N. Y.
Robertson, J. T., Inc., Syracuse, N. Y.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
John Robertson Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
New England Butt. Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Thomson-Judd Wire Machinery Co., Lynn, Mass.

MACHINERY—Bunching
Amer. Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Machinery Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Thomson-Gibb Electric Welding Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

MACHINERY—Chain Making
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Coilers
Broden Const. Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

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H. J. Ruesch Machine Co., Newark, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cutting
Broden Construction Co., Cleveland, O.
F. B. Shuster Co., New Haven, Conn.
Sleeper & Hartley, Worcester, Mass.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Extruding
John Robertson Co., Brooklyn, N. Y.
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Forming
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, O.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Gang Winders
H. J. Ruesch Machine Co., Newark, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Insulating
American Insulating Machinery Co., Phila.
New England Butt Co., Providence, R. I.
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lead Encasing Presses, ets.
John Robertson Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
John Robertson Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Measuring Wire & Cable
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Machinery Co., Phila.

MACHINERY—Pointing
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, O.
Morgan Const. Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
Lewis F'dry & Machine Co., Pittsburgh, Pa.
United Eng. & Foundry Co., Pittsburgh, Pa.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, O.
Lewis F'dry & Machine Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Rubber Strip Covering
Farrel-Birmingham Co., Ansonia, Conn.
New England Butt Co., Providence, R. I.
John Royle & Sons, Paterson, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
John Royle & Sons, Paterson, N. J.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila. Pa.
Broden Construction Co., Cleveland, O.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry and Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Machinery Co., Phila.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Staple
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MACHINERY—Straightening
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H. J. Ruesch Machine Co., Newark, N. J.
F. B. Shuster, New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Const. Co., Cleveland, O.
Lewis F'dry & Machine Co., Pittsburgh, Pa.
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Swaging
H. J. Ruesch Machine Co., Newark, N. J.
Sleeper & Hartley, Worcester, Mass.

MACHINERY—Taping
Amer. Insulating Mach. Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Co., Paterson, N. J.

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Amer. Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
H. J. Ruesch Machine Co., Newark, N. J.

MACHINERY—Welding Wire
F. B. Shuster Co., New Haven, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
American Insulating Machinery Co., Phila.
Broden Const. Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
H. J. Ruesch Machine Co., Newark, N. J.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Thomson-Judd Wire Machinery Co., Lynn, Mass.
Watson Machine Company, Paterson, N. J.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.

POTS—Lead Melting
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Encasing
John Robertson Co., Brooklyn, N. Y.

PRESSES—Lead Extrusion
John Robertson Co., Brooklyn, N. Y.

PULLERS—Wire
E. J. Scudder Fdry. & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

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Watson Machine Co., Paterson, N. J.

ROLLING MILLS—See Machinery—Rolling Mill

ROLLS—
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United Eng. & Fdry. Co., Pittsburgh, Pa.

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American Lanolin Co., Lawrence, Mass.

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Vaughn Machinery Co., Cuyahoga Falls, O.

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Watson Machine Co., Paterson, N. J.

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American Insulating Mach'y Co., Phila., Pa.

WIRE—Enameled For Coils
Winsted Insulated Wire Co., Winsted, Conn.

WIRE—Manufacturers
Keystone Steel & Wire Co., Peoria, Ill.

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.
Seymour Mfg. Co., Seymour, Conn.

WIRE—Non Ferrous to Specification
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Seymour Mfg. Co., Seymour, Conn.
Winsted Insulated Wire Co., Winsted, Conn.

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